APPENDIX C
U.S. ENVIRONMENTAL PROTECTION AGENCY AND THE SERVICES' NOTICES OF AVAILABILITY FOR THE DEIS

Federal Register / Vol. 75, No. 73 / Friday, April 16, 2010 / Notices **19969**

Hayden Power Station permit does not comply with 40 CFR part 70 in that: (I) the title V permit fails to require compliance with particulate matter limits; and (II) the title V permit fails to ensure compliance with Prevention of Significant Deterioration (PSD) requirements in regard to carbon dioxide emissions.

On March 24, 2010, the Administrator issued an order partially granting and partially denying the petition. The order explains the reasons behind EPA's conclusions.

Dated: April 7, 2010.

Carol L. Campbell,

Acting Regional Administrator, Region 8.

[FR Doc. 2010–8773 Filed 4–15–10; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–8989–8]

Environmental Impacts Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information (202) 564–1399 or *http://www.epa.gov/compliance/nepa/.*

Weekly receipt of Environmental Impact Statements Filed 04/05/2010 Through 04/09/2010 Pursuant to 40 CFR 1506.9.

Notice

In accordance with Section 309(a) of the Clean Air Act, EPA is required to make its comments on EISs issued by other Federal agencies public. Historically, EPA has met this mandate by publishing weekly notices of availability of EPA comments, which includes a brief summary of EPA's comment letters, in the **Federal Register**. Since February 2008, EPA has been including its comment letters on EISs on its Web site at: *http://www.epa.gov/compliance/nepa/eisdata.html.* Including the entire EIS comment letters on the Web site satisfies the Section 309(a) requirement to make EPA's comments on EISs available to the public. Accordingly, after March 31, 2010, EPA will discontinue the publication of this notice of availability of EPA comments in the **Federal Register**.

EIS No. 20100121, Draft EIS, DOI, CA, Stanford University Habitat Conservation Plan, Authorization for Incidental Take and Implementation, San Mateo and Santa Clara Counties, CA, Comment Period Ends: 07/15/2010, Contact: Gary Stern, 707–575–6060.

EIS No. 20100122, Final EIS, USFS, 00, Black Hills National Forest Travel Management Plan, Proposes to Designate Certain Roads and Trails Open to Motorized Travel, Custer, Fall River, Lawrence, Meade, Pennington Counties, SD and Crook and Weston Counties, WY, Wait Period Ends: 05/17/2010, Contact: Thomas Willems, 605–673–9217.

EIS No. 20100123, Final EIS, FHWA, TX, US 290 Corridor, Propose to Construct Roadway Improvements from Farm-to-Market (FM) 2920 to Interstate Highway (IH) 610, Funding and Right-of-Way Grant, Harris County, TX, Wait Period Ends: 05/17/2010, Contact: Daniel Mott, 512–536–5964.

EIS No. 20100124, Final EIS, NPS, CA, Prisoners Harbor Coastal Wetland Restoration Project, Proposes to Restore a Functional, Self-Sustaining Ecosystem at a Coastal Wetland Site, Channel Islands National Park, Santa Cruz Island, Santa Barbara County, CA, Wait Period Ends: 05/17/2010, Contact: Paula Power, 805–658–5784.

EIS No. 20100125, Final EIS, BLM, 00, UNEV Pipeline Project, Construction of a 399-mile Long Main Petroleum Products Pipeline, Salt Lake, Tooele, Juab, Millard, Iron, and Washington Counties, UT and Lincoln and Clark Counties, NV, Wait Period Ends: 05/17/2010, Contact: Joe Incardine, 801–524–3833.

EIS No. 20100126, Draft EIS, DOS, 00, Keystone XL Oil Pipeline Project, Presidential Permit for the Proposed Construction, Connection, Operation, and Maintenance of a Pipeline and Associated Facilities at United State border for Importation of Crude Oil from Canada, Comment Period Ends: 06/01/2010, Contact: Elizabeth Orlando, 202–647–4284.

EIS No. 20100127, Final EIS, BIA, MT, Kerr Hydroelectric Project, Proposed Drought Management Plan, Implementation, Flathead Lake, MT, Wait Period Ends: 05/17/2010, Contact: Bob Dach, 503–231–6711.

EIS No. 20100128, Final EIS, USFS, SD, Norbeck Wildlife Project, Proposing to Manage Vegetation to Benefit Game Animals and Birds, Black Hills National Forest, Custer and Pennington Counties, SD, Wait Period Ends: 05/17/2010, Contact: Kelly Honors, 605–673–4853.

EIS No. 20100129, Draft EIS, BLM, NV, Silver State Solar Energy Project, Construct and Operate a 400-megawatt Photovoltaic Solar Plant and Associated Facilities on Public Lands, Application Right-of-Way Grant, Primm, Clark County, NV, Comment Period Ends: 06/01/2010, Contact: Gregory Helseth, 702–515–5173.

EIS No. 20100130, Final EIS, DOT, CA, Silicon Valley Rapid Transit Corridor Project, Proposes to Construct an Extension of the Bay Area Rapid Transit (BART) Rail System from Warm Spring Station in Fremont to Santa Clara County, CA, Wait Period Ends: 05/17/2010, Contact: Eric Eidlin, 415–744–2502.

EIS No. 20100131, Final EIS, EPA, GU, Apra Harbor, Guam, Proposed Site Designation of an Ocean Dredged Material Disposal Site Offshore of Guam, Wait Period Ends: 05/17/2010, Contact: Allan Ota, 415–972–3476.

EIS No. 20100132, Draft Supplement, BLM, CA, Ivanpah Solar Electric Generating System (07–AFC–5) Project, Proposal to Construct a 400-Megawatts Concentrated Solar Power Tower, Thermal-Electric Power Plant, San Bernardino County, CA, Comment Period Ends: 06/01/2010, Contact: Tom Hurshman, 970–240–5345.

Dated: April 13, 2010.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. 2010–8762 Filed 4–15–10; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[FRL–9138–2]

Science Advisory Board Staff Office; Notification of a Public Meeting of the Advisory Council on Clean Air Compliance Analysis (Council)

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: The EPA Science Advisory Board (SAB) Staff Office announces a public meeting of the Advisory Council on Clean Air Compliance Analysis (Council). The Council will conduct quality reviews of three subcommittee reports and review draft chapters of the EPA Office of Air and Radiation's Second Section 812 Prospective Analysis of the benefits and costs of the Clean Air Act.

DATES: The meeting will be held on Tuesday, May 4, 2010 and Wednesday, May 5, 2010, beginning at 8:30 a.m. and ending no later than 5 p.m. (Eastern Time), each day.

ADDRESSES: The public meeting will be held in the Science Advisory Board

6753, (V) 9000–951–1015, (E) *Xavier.montoya@wy.usda.gov*

[FR Doc. 2010–8244 Filed 4–9–10; 8:45 am]

BILLING CODE 3410–16–P

DEPARTMENT OF AGRICULTURE

Forest Service

Shasta County Resource Advisory Committee

AGENCY: Forest Service, USDA.

ACTION: Notice of meeting.

SUMMARY: The Shasta County Resource Advisory Committee (RAC) will meet at the USDA Service Center in Redding, California, on April 28, 2010, from 8:30 a.m. to 12 noon. The purpose of this meeting is to discuss project updates and proposals, information on monitoring efforts and a timeline for the upcoming year.

DATES: Wednesday, April 28 at 8:30 a.m.

ADDRESSES: The meeting will be held at the USDA Service Center, 3644 Avtech Parkway, Redding, California 96002.

FOR FURTHER INFORMATION CONTACT: Resource Advisory Committee Coordinator Rita Vollmer at (530) 226–2595 or *rvollmer@fs.fed.us.*

SUPPLEMENTARY INFORMATION: The meeting is open to the public. Public input sessions will be provided and individuals will have the opportunity to address the Shasta County Resource Advisory Committee.

Dated: April 5, 2010.

J. Sharon Heywood,

Forest Supervisor, Shasta-Trinity National Forest.

[FR Doc. 2010–8250 Filed 4–9–10; 8:45 am]

BILLING CODE M

DEPARTMENT OF AGRICULTURE

Forest Service

Ravalli County Resource Advisory Committee

AGENCY: Forest Service, USDA.

ACTION: Notice of meeting.

SUMMARY: The Ravalli County Resource Advisory Committee will meet in Hamilton, Montana. The purpose of the meeting is presentation on research of generating plants that have been built and project reviews.

DATES: The meeting will be held April 27, 2010.

ADDRESSES: The meeting will be held at 1801 N. First Street. Written comments should be sent to Stevensville RD, 88 Main Street, Stevensville, MT 59870. Comments may also be sent via e-mail to *dritter@fs.fed.us* or via facsimile to 406–777–5461.

All comments, including names and addresses when provided, are placed in the record and are available for public inspection and copying. The public may inspect comments received at 88 Main Street, Stevensville, MT 59870. Visitors are encouraged to call ahead to 406–777–5461 to facilitate entry into the building.

FOR FURTHER INFORMATION CONTACT: Daniel G. Ritter, District Ranger, or Nancy Trotter Coordinator 406–777–5461.

Individuals who use telecommunication devices for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8339 between 8 a.m. and 8 p.m., Eastern Standard Time, Monday through Friday.

SUPPLEMENTARY INFORMATION: The meeting is open to the public. Council discussion is limited to Forest Service staff and Council members. However, persons who wish to bring bio hazards use matters to the attention of the Council may file written statements with the Council staff before or after the meeting. Public input sessions will be provided and individuals who made written requests by April 19, 2010 will have the opportunity to address the Council at those sessions.

Dated: April 6, 2010.

Julie K. King,

Forest Supervisor.

[FR Doc. 2010–8257 Filed 4–9–10; 8:45 am]

BILLING CODE 3410–11–M

DEPARTMENT OF COMMERCE

Environmental Technologies Trade Advisory Committee (ETTAC)

AGENCY: International Trade Administration, U.S. Department of Commerce.

ACTION: Notice of open meeting.

SUMMARY: The Environmental Technologies Trade Advisory Committee (ETTAC) will hold its quarterly meeting to discuss environmental technologies trade liberalization, industry competitiveness issues, and general Committee administrative items.

DATES: April 23, 2010.

ADDRESSES: U.S. Department of Commerce, 1401 and Constitution Avenue, NW., Washington, DC 20230, Room 4830.

FOR FURTHER INFORMATION CONTACT: Ellen Bohon, Office of Energy and Environmental Technologies Industries (OEEI), International Trade Administration, U.S. Department of Commerce at (202) 482–0359. This meeting is physically accessible to people with disabilities. Requests for sign language interpretation or other auxiliary aids should be directed to OEEI at (202) 482–5225.

SUPPLEMENTARY INFORMATION: The meeting will take place from 9 a.m. to 3:30 p.m. This meeting is open to the public and time will be permitted for public comment from 3–3:30 p.m. Written comments concerning ETTAC affairs are welcome anytime before or after the meeting. Minutes will be available within 30 days of this meeting.

The ETTAC is mandated by Public Law 103–392. It was created to advise the U.S. government on environmental trade policies and programs, and to help it to focus its resources on increasing the exports of the U.S. environmental industry. ETTAC operates as an advisory committee to the Secretary of Commerce and the Trade Promotion Coordinating Committee (TPCC). ETTAC was originally chartered in May of 1994. It was most recently re-chartered until September 2010.

Dated: April 7, 2010.

Edward A. O'Malley,

Director, Office of Energy and Environmental Industries.

[FR Doc. 2010–8240 Filed 4–9–10; 8:45 am]

BILLING CODE 3510–DR–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

RIN 0648–XV36

Stanford University Habitat Conservation Plan

AGENCIES: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce; Fish and Wildlife Service, Interior (DOI).

ACTION: Notice of availability of draft environmental impact statement, multi-species habitat conservation plan, and receipt of application; notice of public meeting.

SUMMARY: This notice announces the availability of the Draft Environmental Impact Statement (DEIS) for Authorization for Incidental Take and Implementation of Stanford University

Habitat Conservation Plan (Plan), and the Implementing Agreement (IA) for public review and comment. In response to receipt of an application from The Board of Trustees of Leland Stanford Junior University (Stanford; Applicant), the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration, National Marine Fisheries Service (Services), are considering the proposed action of issuing a 50–year permit for four federally listed species and one currently unlisted species. The proposed permit would authorize the incidental take of individual species listed under the Federal Endangered Species Act of 1973, as amended (ESA). The permit is needed because take of species could occur during the operation and maintenance of the University, academic activities, athletic and recreational activities, leasehold activities, urban development, and resource conservation activities associated with the Plan at Stanford, which is located on 8,180–acres in San Mateo County and Santa Clara County, California.

DATES: Written comments on the DEIS, Plan, and IA, must be received by 5 p.m. Pacific Time on July 12, 2010.

ADDRESSES: Comments concerning the DEIS, Plan, and IA can be sent by U.S. Mail, facsimile, or email to (1) Eric Tattersall, Chief, Conservation Planning and Recovery Division, Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2800 Cottage Way, Room W–2605, Sacramento, California 95825; facsimile (916) 414–6713; (2) Gary Stern, San Francisco Bay Region Supervisor at National Marine Fisheries Service, 777 Sonoma Avenue, Room 325, Santa Rosa, CA 95404, facsimile (707) 578–3435; or (3) Stanford.HCP@noaa.gov. Include the document identifier: Stanford HCP.

A public meeting will be held on May 25, 2010, from 7 p.m. to 9 p.m. at the Stanford University Tresidder Student Student Union Oak West Lounge, 459 Lagunita Drive, Stanford, CA.

FOR FURTHER INFORMATION CONTACT: Sheila Larsen, Senior Staff Biologist, U.S. Fish and Wildlife Service; telephone 707–575–6060.

SUPPLEMENTARY INFORMATION: Copies of the DEIS, Plan and IA are available for public review during regular business hours from 9 a.m. to 5 p.m. at the U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**), and the National Marine Fisheries Service, Santa Rosa Office (see **FOR FURTHER INFORMATION CONTACT**). Additionally, hard bound copies of the DEIS, Plan, and IA are available for viewing, or for partial or complete duplication, at the following locations:

1. Social Sciences Resource Center, Green Library, Room 121, Stanford, CA 94305
2. Palo Alto Main Library, 1213 Newell Road, Palo Alto, CA 94303.

Individuals wishing copies of the DEIS, Plan, or IA should contact either of the Services by telephone (see **FOR FURTHER INFORMATION CONTACT**) or by letter (see **ADDRESSES**). These documents are also available electronically for review on the NMFS Southwest Region website at: *http://swr.nmfs.noaa.gov* or the U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office Website at *http://www.fws.gov/sacramento/*.

Background

Section 9 of the Federal ESA of 1973, as amended, and Federal regulations prohibit the take of fish and wildlife species listed as endangered or threatened (16 U.S.C. 1538). The term ''take'' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 U.S.C. 1532). Harm includes significant habitat modification or degradation that actually kills or injures listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, and sheltering (50 CFR 17.3(c)). The National Marine Fisheries Service further defines harm as an act which actually kills or injures fish or wildlife, and expands the list of essential behavioral patterns that can be impaired by habitat modification or degradation to include breeding, spawning, rearing, migrating, feeding or sheltering (50 CFR 222.102). Under limited circumstances, the Services may issue permits to authorize incidental take of listed fish or wildlife; i.e., take that is incidental to, and not the purpose of, otherwise lawful activity. Regulations governing incidental take permits for threatened and endangered species are found in 50 CFR 17.32 and 17.22, respectively.

Each of the Services has received an application for an incidental take permit for implementation of the Plan. The applications were prepared and submitted by The Board of Trustees of Leland Stanford Junior University (Applicant). The Applicant has prepared the Plan to satisfy the application requirements for a section 10(a)(1)(B) permit under the Federal ESA, of 1973, as amended.

The Applicant seeks a 50–year incidental take permit for covered activities within a proposed 8,180 acre permit area located in southern San Mateo and northern Santa Clara counties. The permit area includes all of Stanford's lands, which are located on portions of the Santa Cruz Mountains and at the base of the San Francisco Peninsula. Stanford University is located in two main watersheds, Matadero/Deer Creek and San Francisquito Creek watersheds. The San Francisquito Creek watershed spans San Mateo and Santa Clara Counties, and encompasses an area of approximately 45 square miles. This watershed includes San Francisquito, Los Trancos, Corte Madera, Bear, Dennis Martin, Sausal, and Alambique creeks, and portions of San Francisquito, Los Trancos, Corte Madera, and Bear creeks flow through Stanford lands. The Matadero Creek watershed is entirely within Santa Clara County, and portions of Matadero and Deer creeks flow through Stanford. In addition to significant riparian areas associated with the creeks, the permit area includes foothills, and most of the main campus is located on an alluvial plain located between the foothills and San Francisco Bay.

The Applicant has requested permits that will authorize the take of four animal species, which are currently listed as threatened or endangered under the Federal ESA, and one animal species that may become listed under the ESA. Proposed covered species includes the federally listed as threatened California tiger salamander (*Ambystoma californiense*), California red-legged frog (*Rana aurora draytonii*), San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), and Central California Coast steelhead (*Oncorhynchus mykiss*). Proposed covered species also includes one animal species that is not listed under the Federal ESA at the current time: the western pond turtle (*Clemmys marmorata*).

If the proposed Plan is approved and the permit issued, take authorization of covered listed species would be effective at the time of permit issuance. Take of the currently non-listed covered species would be authorized concurrent with the species' listing under the Federal ESA, should it be listed during the duration of the permit.

The proposed Plan is intended to be a comprehensive document, providing for species conservation and habitat planning, while allowing the applicant to better manage ongoing operations and future growth. The proposed Plan also is intended to provide a coordinated process for permitting and mitigating the take of covered species as an alternative to a project-by-project approach.

In order to comply with the requirements of the Federal ESA, the proposed Plan addresses a number of required elements, including: species and habitat goals and objectives; evaluation of the effects of covered activities on covered species, including indirect and cumulative effects; a conservation strategy; a monitoring and adaptive management program; descriptions of changed circumstances and remedial measures; identification of funding sources; and an assessment of alternatives to take of listed species.

The Plan divides the permit area into four "zones." Zone 1 supports one or more of the covered species or provides critical resources for the species. Zone 2 areas are occasionally occupied by a covered species and provide some of the resources used by the species, or buffers between occupied habitat and urbanized areas. Zone 3 consists of generally undeveloped land that provides only limited and indirect benefit to the covered species. Zone 4 includes urbanized areas that do not support the covered species. The Plan covers the ongoing operation and maintenance of the University, existing facilities, and a limited amount of future development. Ongoing operations and maintenance are divided into the following categories of activities: water management; creek maintenance; academic activities; utility installation and maintenance; general infrastructure; recreation and athletics; grounds and vegetation; agricultural and equestrian leaseholds; and commercial and institutional leaseholds. Up to 180 acres of development in Zones 1, 2, and 3 are also covered by the Plan, but the Plan does not supersede any permitting or entitlement required by other regulations.

The Plan's proposed conservation strategy is designed to minimize and mitigate the impacts of covered activities, improve habitat conditions for listed covered species, and protect populations of the non-listed covered species. The Plan includes minimization measures that would avoid and minimize the take of covered species from ongoing operation and maintenance of the University and future development. The Plan also includes mitigation for the loss of habitat, and proposes to conserve approximately 360 acres of riparian habitat within conservation easements within one year of issuance of the permits. Additional riparian habitat would be preserved as needed. A 315–acre "California Tiger Salamander Reserve" also would be established at the outset of the Plan. No development would be permitted within the Reserve for the term of the permits, and habitat within the Reserve would be permanently protected to offset any loss of tiger salamander habitat that occurs during the permit term. Habitat protected under the Plan would be managed and monitored, and annual reports documenting the status of the species and compliance with the Plan would be submitted to the Services. In addition to the minimization measures and mitigation for the loss of habitat, the Plan includes a number of potential habitat enhancements that Stanford may perform during the term of the permits. Other conservation activities include a California tiger salamander management plan that covers 95 acres, including Lagunita Reservoir and habitat around Lagunita Reservoir.

National Environmental Policy Act Compliance

Proposed permit issuance triggers the need for compliance with the National Environmental Policy Act (NEPA). As co-lead agencies, the Services have prepared a DEIS which evaluates the impacts of the proposed issuance of the permit and implementation of the Plan, as well as a reasonable range of alternatives.

The DEIS analyzes three alternatives including the issuance of incidental take permits and applicant implementation of the proposed Plan described above. The issuance of 50–year take permits and applicant implementation of the proposed Plan is considered the Preferred Alternative. Two other alternatives being considered by the Services include the following:

Under the No Action Alternative, the Services would not issue incidental take permits for implementation of the Stanford University Habitat Conservation Plan. As a result, the Applicant would likely seek individual incidental take authorization as needed for new projects and ongoing operations that would result in the take of federally listed species.

Under the California Tiger Salamander Only Alternative, Stanford would prepare a Habitat Conservation Plan only for the California tiger salamander, and obtain section 10 authorization only for the take of California tiger salamander. Future development and ongoing activities that would result in the take of other listed species would be permitted individually, as needed.

Public Comments

The Services invite the public to comment on the draft Plan, draft IA, and DEIS during a 90–day public comment period beginning on the date of this notice. All comments and materials received, including names and addresses, will become part of the administration record and may be released to the public. Our practice is to make comments, including names, home addresses, home telephone numbers, and email addresses of respondents available for public review. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment including your personal identifying information may be made publicly available at any time. While you may ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

This notice is provided pursuant to section 10(c) of the Act and regulations for implementing NEPA, as amended (40 CFR 1506.6), We provide this notice in order to allow the public, agencies, or other organizations to review and comment on these documents.

Special Accommodations

The public meeting is physically accessible to people with disabilities. Requests for sign language interpretation or other auxiliary aids should be directed to Gary Stern, National Marine Fisheries Service, at 707–575–6060, at least 5 working days prior to the meeting date.

Next Steps

The Services will evaluate the applications, associated documents, and public comments submitted to them to prepare a final EIS. A permit decision will be made no sooner than 30 days after the publication of the final EIS and completion of the Record of Decision.

Dated: April 7, 2010.

Ken McDermond,

Deputy Region Director, Pacific Southwest Region, U.S. Fish and Wildlife Service.

Dated: April 7, 2010.

Angela Somma,

Chief, Endangered Species Division, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. 2010–8300 Filed 4–9–10; 8:45 am]

BILLING CODES 3510–22–S, 4310–55–S

DEPARTMENT OF COMMERCE

Bureau of Industry and Security

Emerging Technology and Research Advisory Committee; Notice of Open Meeting

The Emerging Technology and Research Advisory Committee (ETRAC)

APPENDIX D
STANFORD'S JANUARY 4, 2011 LETTER TO THE SERVICES REVISING THE HCP AND APPLICATION

STANFORD UNIVERSITY
LAND USE AND ENVIRONMENTAL PLANNING

January 4, 2011

Mr. Gary Stern
NOAA Fisheries
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404

Ms. Sheila Larsen
U.S. Fish and Wildlife Service
2800 Cottage Way, Room W-2605
Sacramento, CA 95825

Dear Mr. Stern and Ms. Larsen:

Thank you for your continued efforts to process Stanford University's incidental take permit application and Habitat Conservation Plan (HCP). The HCP, which was included with Stanford's April 2008 permit applications to the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) and U.S Fish and Wildlife Service (USFWS), included certain Searsville Dam and Reservoir (collectively, "Searsville") related operational and maintenance activities, and requested incidental take authorization for those activities. After carefully reviewing these activities further, and in light of Stanford's recent expansion and acceleration of a comprehensive interdisciplinary study of Searsville which Stanford anticipates will likely conclude with a proposed project that includes changes to the operational and maintenance activities described in the HCP, Stanford has decided to remove these activities from the HCP, and is no longer seeking incidental take authorization for these activities.

In 2008, when the permit application was filed with NOAA Fisheries and USFWS, Stanford did not have any plans to undertake any major modifications at Searsville, and had not yet identified a process for addressing the future of Searsville. Stanford therefore made its best effort to cover its current Searsville operations and maintenance, because those operations and maintenance were unlikely to change. Stanford's biologists, based on the best available scientific information (which we have provided to you), have concluded that these activities have a negligible effect on steelhead. Nevertheless, in an effort to be as inclusive as possible, Stanford included Searsville-related maintenance and operational activities in the HCP.

As you know from our ongoing discussions, there are no precise data regarding the flows just below Searsville Dam, making it difficult to accurately quantify the effects, if any, that the Searsville diversion has on flows just below Searsville Dam. What the data do show is that creek flows below Searsville Dam fluctuate widely, and these fluctuations may be attributed to several, sometimes interrelated, natural and manmade factors. Stanford appreciates NOAA Fisheries' desire to quantitatively assess the effects of these covered activities on steelhead. However, based on our discussions with NOAA Fisheries about the information needed to conduct this

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effort, it appears that the data and scientific information may well not exist to fully address specific questions raised during the comment period.

Stanford is committed, through an independent Searsville specific process, to continue studying the effects of Searsville on steelhead. Through this process, Stanford also will thoroughly evaluate the effect of various modifications (including alternative diversion/storage configurations) at Searsville on steelhead, and other sensitive environmental resources. Stanford believes that removing these activities from the HCP, and addressing them through an independent Searsville-focused process, will provide NOAA Fisheries with the additional time and data that it needs to assess the potential take of steelhead from Searsville-related activities, and it will facilitate the current Section 10 permit process for the remaining covered activities. Stanford is eager to conclude this Section 10 permit process and begin implementing the HCP's conservation program, which will protect and enhance habitat at Stanford, and provide valuable monitoring data.

The Searsville facilities have been part of the watershed since 1892, and are part of the environmental baseline in NOAA Fisheries' Biological Opinion for the Steelhead Habitat Enhancement Project (SHEP). Since NOAA Fisheries issued the SHEP Biological Opinion in 2008, Stanford has improved fish passage by implementing the SHEP. However, little else has changed in the watershed since then. NOAA Fisheries therefore already has substantial data to complete the environmental baseline and evaluate the remaining covered activities. In addition, Stanford has provided you with supplemental data regarding the environmental baseline, including water quality data, flow data from local stream gages, and a historical background of the land uses that affected steelhead habitat in the San Francisquito Creek watershed prior to the construction of Searsville Dam. We believe this is sufficient data to assess the effects of the remaining covered activities and complete the Environmental Impact Statement.

Stanford has been working with NOAA Fisheries and USFWS for more than a decade, and we are pleased that we are now so close to the completion of the current Section 10 permitting process. We will therefore provide you with Stanford's final HCP showing the removal of the Searsville-related covered activities (e.g., operation and maintenance of the Searsville diversion and reservoir, which includes reservoir dredging, pipe flushing, physically cleaning the dam face, etc.), and related conservation actions that are no longer relevant to any of the covered activities very shortly. In the meantime, if you have any questions, please do not hesitate to contact me.

Sincerely,

Catherine Palter

Catherine Palter
Associate Director, Land Use and Environmental Planning

cc: Charles Carter, Stanford University
Alan Launer, Stanford University
Shelby Mendez, NOAA Fisheries
Amanda Morrison, NOAA Fisheries
Deanna Harwood, NOAA Fisheries
John Robles, U.S. Fish & Wildlife Service
Eric Tattersall, U.S. Fish & Wildlife Service
Tay Peterson, TRA
Shawn Zovod, Ebbin Moser + Skaggs

APPENDIX E
STANFORD'S JANUARY 6, 2011 DOCUMENT ENTITLED "THE FUTURE OF SEARSVILLE DAM AND RESERVOIR"

The Future of Searsville Dam and Reservoir

Over the last 15 years, Stanford University has conducted technical studies and gathered data and community input on the Searsville Dam and Reservoir. We are now initiating a process that will result in a plan for addressing the long-term future of the dam and reservoir. During this process, a multidisciplinary team of Stanford staff and faculty will assess the functional objectives of the Searsville Dam and Reservoir in light of the needs of the University, the surrounding community, and the environment. Factors to be considered include the University's research and academic programs at the Jasper Ridge Biological Preserve; the University's water supply and storage needs; biological diversity, including both the habitats and wetlands created by the reservoir as well as potential fish passage upstream of the dam; possible effects on upstream and downstream flood risk; and the cost and impact of sediment removal, disposal and ongoing management. Action alternatives include maintaining the current state of the dam and reservoir, removing sediment from the reservoir to restore some or all of its original capacity, modifying the dam, removing the dam, or combinations of these actions. Alternatives will be evaluated to identify the approach that best achieves the objectives and minimizes tradeoffs between them. We anticipate completing a concept alternatives study based on this analysis in approximately 2 years, to be followed by a collaborative review process with various agencies and public stakeholders, leading ultimately to project implementation. More details of the full process are provided below.

Background

Searsville Dam was completed by the Spring Valley Water Company in 1892, which contracted with Stanford at that time to supply the University 344 million gallons of water per year, its entire original capacity. The University purchased the dam in 1919. By the 1930s, the reservoir had lost half its original capacity due to accumulating sediment from upstream, and today its volume is about 10 percent of its original capacity. Without remediation, sedimentation will continue to fill the reservoir. Despite the sedimentation, however, Searsville continues to serve as a water source (typically hundreds of acre-feet per year) for the University, and its value as a potential long-term and significant sustainable water supply is important.

The dam is in sound structural condition; it performed well in both the 1906 and 1989 earthquakes. The dam is annually inspected by the State's Department of Water Resources, Division of Safety of Dams. A routine below-water level inspection of the dam is due, and is being scheduled by Stanford and the state.

Stanford is awaiting approval of its Habitat Conservation Plan (HCP), which provides a comprehensive conservation program for five protected species, including steelhead. If approved, federal wildlife agencies will issue incidental take permits that will authorize the "take" of these species during the course of the activities described in the HCP. If a new action is proposed at Searsville Dam and Reservoir, it will need to comply with the Endangered Species Act, and obtain a federal incidental take permit, in addition to complying with other local, state, and federal regulations. Stanford has proposed in the HCP to study the technical feasibility of fish passage alternatives in conjunction with any future Stanford or agency proposals to modify Searsville Dam, or within 10 years if no proposal is made.

Several faculty members have expressed interest in the challenges of determining the future of Searsville. In addition, faculty members have expressed interest in pursuing associated academic research opportunities.

Issues

The issues surrounding Searsville are very complex and include the following:

Academic Resources / Resource Conservation.

Jasper Ridge Biological Preserve. As noted in Jasper Ridge Advisory Committee's position paper of October 2007, "Searsville Lake provides a number of important benefits to the Preserve. Ecologically, it supports a range of habitats, including the reservoir itself, the associated wetlands, and all of the habitats with species that use the reservoir and wetlands for feeding or breeding…As a consequence, Searsville Lake is a unique educational and research resource. It provides opportunities for students to have direct experience with a range of globally and locally important habitats, environmental issues, and engineering topics...Recent projects have pursued questions in biogeochemistry, hydrology, atmospheric chemistry, remote sensing, animal behavior, and sedimentology."

Protected Species. San Francisquito Creek, located downstream of Searsville Dam, supports steelhead and California red-legged frog, which are protected under the Endangered Species Act. In addition, it provides habitat for western pond turtle, which is a candidate species for protection. The dam has blocked upstream fish passage since its construction in 1892; however, potential steelhead habitat exists upstream of the dam.

Cultural Resources. Searsville Dam may also be a significant historic structure subject to protection as a cultural resource. The dam is a very early example of a poured-in-place concrete block dam and is listed on the State of California Historic Resources Inventory. There are other historic properties and archaeological resources in the immediate vicinity of the dam as well. These historic features are also important resources for research in the areas of engineering, hydrology, history and archaeology.

***Water Supply*.** Even with Searsville's declining water storage volume, the facility remains an active and valuable sustainable water resource for the University. Water originating from the Searsville diversion is currently used for irrigation of Stanford's extensive agricultural fields, plant nurseries, golf course, athletic fields, and campus landscaping. The water supply function requires a point of diversion and storage capacity, which are presently provided by the Searsville diversion at the dam, and the reservoir itself. Water from the Searsville diversion is important as a non-potable water supply; however, with treatment, it could also constitute a potable water supply.

Flood Protection**.** Searsville Dam was not engineered or constructed, or ever operated, to function as a flood control facility. Several creeks flow into Searsville, most notably Corte Madera, Sausal, Dennis Martin, and Alambique. The creeks' flows range from hundreds of cubic feet per second in winter storms to barely a trickle in the summer. Searsville Reservoir fills up and spills after just the first few storms, and remains full and spilling through the rainy season and into early summer. Flow data from recent significant storms at both the dam and downstream in San Francisquito Creek indicate the possibility of a slowing down of flow caused by the sediments, marshes and vegetation upstream of the dam, possibly resulting in somewhat reduced peak flow and possibly delayed flow to San Francisquito Creek; however, the extent of this effect in major storms is unknown. Whether Searsville Dam and Reservoir could be modified to alleviate upstream flooding risk and/or provide downstream flood control benefits is extremely complex and requires significant hydrologic and engineering analyses.

Sediment Management**.** Searsville Dam has retained much of the sediments carried by its tributary creeks for more than 100 years, resulting in the reduction of water storage capacity and in the development of forested wetlands and related ecology. Urban development downstream of the dam occurred over those same 100+ years under conditions of decreased sediment load. Sediment management issues exist both with the disposal of the sediment that has accumulated behind the dam and with the ongoing sediment that will be transported annually by contributing streams, and the potential impact of that sediment on downstream creek conditions.

Liability**.** The University's potential liability for Searsville and for any possible contemplated action, including removal, will have to be carefully evaluated as an integral part of all studies and analyses.

Study Objectives

Searsville has evolved from its initial 1892 purpose of water diversion and storage to include other functions and ecological features. The unintended functions include sediment trapping, and possibly, to some unknown extent, flood water detention. Biological features that have established adjacent to the open water of the reservoir include fresh water marsh and forested wetlands. Two other consequences of the dam's construction have been potential hydrologic changes immediately upstream of the reservoir, and obstruction of fish passage from below the facility to the tributary creeks above it.

The analysis of the previously identified issues will be used to define a set of quantifiable functional objectives that best achieve Stanford's interests in resource conservation, academic programming and watershed management, balancing tradeoffs that may need to occur between competing objectives. The determination of the right approach at Searsville is complicated because of the potential incompatability of these functions.

Possible actions

Once functional objectives have been established, Stanford will evaluate alternative actions to determine how they might achieve the objectives. Based on work that has been conducted to date, the following general alternative actions are anticipated to be included for additional study:

1. *No Action*: Allow the reservoir to fill with sediments and transition to marsh and forested wetlands.
2. *Leave the dam and remove sediment*: Maintain the reservoir, ranging in capacity from its current size to its original capacity, and continue periodic sediment removal.
3. *Alter the dam and remove sediment*: Modify the dam and reservoir to enable them to be operated for upstream and/or downstream flood control and sediment management in addition to water supply/storage.
4. *Remove the dam*: Allow Corte Madera Creek and the other creeks to flow downstream.

Technical Studies

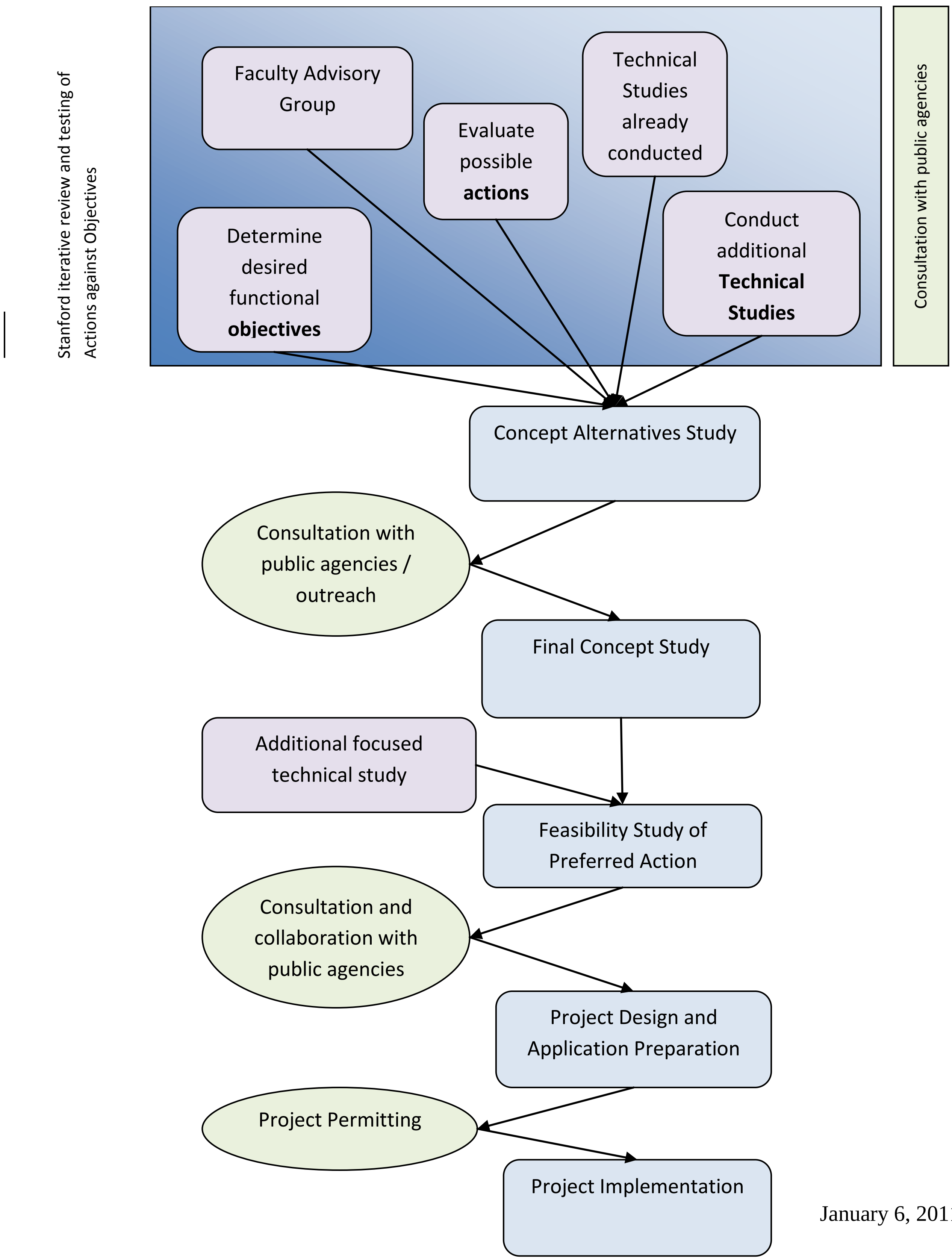
Technical analyses and other studies of the Searsville area have been conducted over at least the last 15 years. Stanford's expanded effort will build on past studies of biological and hydrological conditions in the vicinity of the reservoir. Technical study components include:

- Hydrology - surface water: water supply/storage, alternative diversion/storage configurations, flood control benefits (refine previous analyses)
- Hydrology - groundwater: consequences of dewatering reservoir
- Geotechnical: nature of sediments, removal process options, drying time frame and dredging spoils drying bed configurations/locations, possible uses, stockpile location options, ongoing sediment management
- Structural: for any dam modification or removal options
- Civil: bypass/fish ladder configuration, sediment disposal, conveyance, and site work
- Biological resources: fish ladder/passage design criteria, and analyses of all effects on wetlands, biotic communities, and listed and non-listed species
- Cultural resources: analyses of historic and archaeological resources and potential impacts
- Legal: liability and approvals/permitting aspects
- Cost: estimated cost and cost/benefit analyses
- Construction: methodology options, logistics, and impact minimization

Process

Figure 1 provides a flowchart of the process to be undertaken to determine the future of the Searsville area. In order to create the concept study, the development of the objectives for the area, the possible future actions, and the technical studies will be analyzed and refined to identify the possible options that will best meet the selected objectives. Initially, an internal Stanford study effort will include staff and consultants interacting with a Stanford faculty advisory group formed to participate in scoping, review, and evaluation of the concept study components. During the development of the concept study, Stanford will consult with federal, state, and local agencies to review the findings to date and obtain the agencies' perspectives about both the objectives and possible actions. Once the concept alternatives study is completed (in approximately 2 years), Stanford will conduct public outreach to communicate preliminary findings of the analysis and receive feedback. Following that phase, the concept study will be finalized, and a feasibility study of a preferred action will be prepared, incorporating additional required technical studies. Stanford will consult with the same agencies to review the findings of the feasibility study. The final phases of this process are project design, preparation of appropriate project applications, project permitting and implementation. A project of this complexity and regional interest will take many years for design, environmental review, and permitting, and Stanford is committed to a thorough, collaborative, and open approval process for determining the future of Searsville.

FIGURE 1. THE FUTURE OF SEARSVILLE DAM AND RESERVOIR PROCESS DIAGRAM



January 6, 2011

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR AUTHORIZATION FOR INCIDENTAL TAKE AND IMPLEMENTATION OF THE STANFORD UNIVERSITY HABITAT CONSERVATION PLAN

APPENDIX F
NMFS REPORT ENTITLED "AN ASSESSMENT OF BYPASS FLOWS TO PROTECT STEELHEAD BELOW STANFORD UNIVERSITY'S WATER DIVERSION FACILITIES ON LOS TRANCOS CREEK AND SAN FRANCISQUITO CREEK" FEBRUARY 15, 2006. 32 PAGES.

An Assessment of Bypass Flows to Protect Steelhead below Stanford University's Water Diversion Facilities on Los Trancos Creek and San Francisquito Creek

National Marine Fisheries Service
Southwest Region- Santa Rosa Area Office
777 Sonoma Avenue, Rm 325
Santa Rosa, California 95404

February 15, 2006

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1.0 Introduction

Stanford University's (Stanford) demands for irrigation water pose a potential risk to federally listed threatened steelhead trout (*Oncorhynchus mykiss*) in Los Trancos Creek, a major tributary of San Francisquito Creek in Santa Clara County, California. Approximately eight miles long, Los Trancos Creek is one of the last streams flowing to South San Francisco Bay to support regular runs of anadromous steelhead trout. It also has historically provided much of Stanford's water for irrigation. At issue is the potential loss of steelhead that would result from Stanford's proposed modifications to its existing water diversion facility and a fish passage facility located at that site. The steelhead run in Los Trancos Creek is a component of the Central California Coast Evolutionarily Significant Unit of steelhead trout that was listed as threatened under the Federal Endangered Species Act (62 FR 43937, August 18, 1997).

Stanford exercises several water rights at the Los Trancos Creek diversion, including License No. 1723. Stanford has long held state water right License 1723, which allows the annual diversion of up to 900 acre-feet of water during the period December 1 through May 1 of each year. Under this license, Stanford can divert water at a maximum rate of 40 cfs from Los Trancos Creek and San Francisquito Creek to Stanford's storage reservoir, Felt Lake. License No. 1723, as amended, includes minimum bypass requirements of 0.1 cfs. However, despite the inadequacy of this bypass requirement for the protection of fisheries or other public resources, the existing diversion facility provides substantial bypass flows because of structural limitations and because of operations of the facility's fish ladder. In addition, Stanford voluntarily provides minimum bypass flows of 0.5 cfs during December and 1 cfs between January 1 and May 1. These bypass flows and a draft Memorandum of Understanding (MOU) were proposed as permanent terms in discussions between Stanford and the California Department of Fish & Game (DFG) in a January 2002 meeting. However, the draft agreement concerning bypass flows for Los Trancos Creek was never finalized or approved by DFG.

To improve the reliability of its water supply and the effectiveness of its fish ladder, Stanford seeks to modify its Los Trancos diversion structure and the associated fish passage facility. If implemented, these modifications would make the diversion structure much more efficient at diverting water, and it would have the capability of further reducing flows supporting habitat for adult and juvenile steelhead. Modification of the existing instream structures will require a Clean Water Act, Section 404 Permit from the Army Corps of Engineers, which will necessitate consultation with the National Marine Fisheries Service (NMFS) to address effects of the project on the federally listed steelhead population.

During the past fifteen months Stanford has worked with NMFS and DFG to identify a diversion plan that would protect steelhead while affording Stanford its water supply for irrigation. The results of that collaborative effort is a plan that achieves these objectives by limiting Stanford's diversions from Los Trancos Creek while increasing diversions from Stanford's existing point of diversion on San Francisquito Creek. This report describes that plan, and it provides the approach and methods employed by NMFS and DFG to develop recommended minimum bypass flows and maximum rates of diversion for Stanford's diversion facilities on Los Trancos and San Francisquito Creeks. The recommended diversion plan does not avoid all potential impacts of Stanford's diversions to steelhead and other aquatic resources; however, it greatly reduces the potential magnitude of these impacts and it provides Stanford with its water supply for irrigation during all but the driest water years.

1.1 Study Area

San Francisquito Creek drains an approximately 43 mi^2 watershed that enters the southern end of San Francisco Bay near Palo Alto, California. Its lowermost 8 miles is the boundary between Santa Clara and San Mateo Counties. San Francisquito Creek flows about 13 miles downstream from the Searsville Dam, which was constructed in 1892 and impounds the creek at its confluence with its headwater tributaries Corte Madera and Westridge Creeks.

Describing the San Francisquito watershed, SCVWD (2003) states,

> *Factors, both human and natural, contribute to a high sediment supply to the system. A history of grazing, development and commercial forestry have increased runoff rate. As a result, the watershed displays slope wash, landslides and gullying (Royston Hanamoto Alley & Abey et al. 2000). The upland areas of the watershed consist of poorly consolidated sedimentary bedrock. Easily eroded sediments and rapid precipitation runoff contribute to high rates of erosion within the watershed (Royston Hanamoto Alley & Abey et al. 2000). The San Francisquito watershed has 4 major faults associated with the San Andreas Fault system. Los Trancos, Corte Madera, and West Union Creeks are aligned with faults. The high seismicity of the area further contributes to the sediment supplied to the creeks (Royston Hanamoto Alley & Abey et al. 2000).*
>
> ***Precipitation***
>
> *The San Francisquito watershed climate is characterized by warm dry summers and moderate wet winters. Average annual rainfall recorded at Dahl Ranch Station 24 (1966-1997 SCVWD data) was 34 inches. Dahl Ranch Station is located on the southeastern ridge of the watershed boundary (Map 3). Historically, rainfall is common November through March, with January and February the highest average totals. …Mean annual rainfall near the confluence of Los Trancos and San Francisquito Creeks at Piers Lane is 18.5 inches (Owens et al. 2003).*

Los Trancos Creek is one of three major tributaries entering the free flowing section of San Francisquito Creek downstream from Searsville Dam (Figure 1). An approximately eight mile long stream with a roughly 7.6 mi^2 watershed, Los Trancos Creek is also part of the boundary between Santa Clara and San Mateo Counties. Average daily flow during winter ranges from 1 cfs to over 200 cfs; whereas summer flow is often less than 1 cfs and surface flow may cease in some reaches during some summer months. Carmen and White (2004) summarize existing information and data concerning the steelhead run in Los Trancos Creek. SCVWD (2003) provides additional information concerning steelhead spawing habitat in San Francisquito Creek, and Smith and Harden (2001) summarized the principal artificial barriers to steelhead passage on San Francisquito Creek.

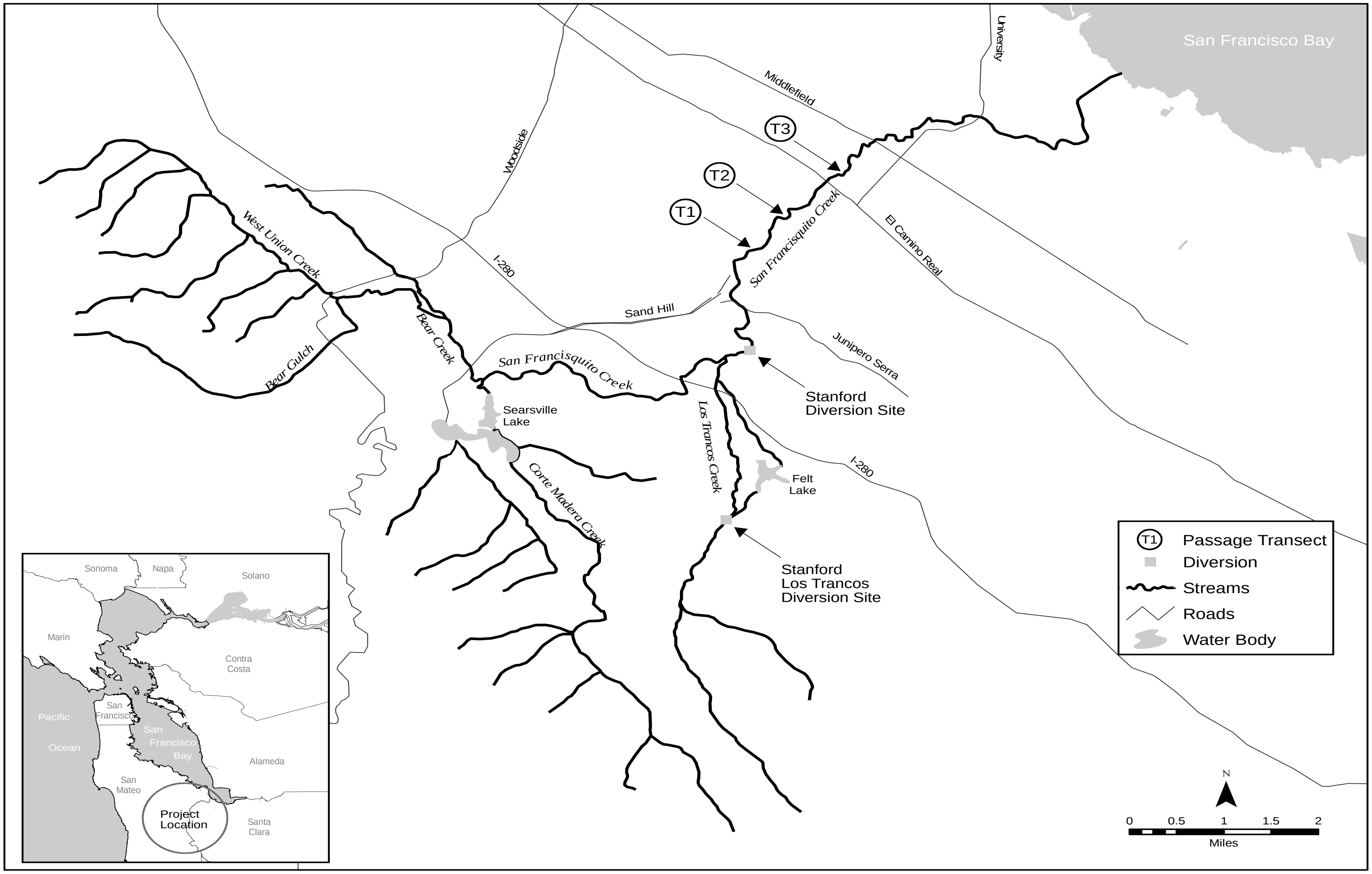


Figure 1. San Francisquito Creek watershed, location of the three fish passage transects, and the Stanford water diversion sites.

2.0 Methods

2.1 *Assessment of minimum bypass flows for the Los Trancos diversion site*

Bypass flow needs to protect fisheries below the Los Trancos diversion site were assessed using site-specific information reported by Smith (1995) and Carmen and White (2004; 2005), as well as relevant scientific literature concerning the ecology of anadromous salmonids. In an assessment of stream flow requirements for migrating steelhead in Los Trancos Creek, Smith (1995) reported the depths across a series of five shallow riffles during at least three separate flows. Carmen and White (2004) provided additional physical habitat data at five representative riffles and five pools in the section of Los Trancos Creek downstream from the Stanford diversion facility. Carmen and White's 2004 study reported stream depths, widths, and a series of cross-sectional measurements at each of the five study riffles during five separate flows (estimated flows of 0.6, 0.8, 1.03, 4.3, and 15.2 cfs immediately below the diversion site). To further document habitat and passage conditions at flows of 2 to 8 cfs, Carmen and White (2005) reported thalweg depths along four riffles and the maximum depths of two pools when stream flows immediately below the diversion site were estimated to be 1, 2, 3, 4, approximately 6, and 7.5 cfs. Carmen and White (2005) also systematically video-recorded each of the study riffles and pools during each of the study flows.

In addition to assessing bypass flow needs for fisheries, NMFS and Stanford evaluated the potential effects of alternative bypass flows on potential water supply for Stanford. This was done using Stanford's estimated water yield during 10 separate water years (1995-2004) under 12 alternative minimum flow scenarios. The results of this water supply analysis for Los Trancos Creek are presented in Attachment A.2 of the November 28, 2005 letter and report from T. Zigterman, Stanford University Facilities Operations, to G. Stern and B. Hearn, NMFS.

2.2 Assessment of minimum bypass flows and maximum rates of diversion for the San Francisquito diversion site

Bypass flow needs to protect steelhead below Stanford's diversion site on San Francisquito Creek were assessed using a modification of Thompson's (1972) method to determine passage flows for adult salmonids. Thompson's method entails identifying a series of shallow riffles that potentially affect fish passage, establishing transects across the shallowest locations, and then determining, for each transect, the flow at which a minimum depth criterion is maintained across both at least 25% of the total channel width and a contiguous minimum width of 10% of the channel. Thompson then recommends averaging the results for all the study transects, and the averaged value is the passage flow recommendation for the stream segment. Thompson (1972) recommends a minimum passage depth criterion of 0.6 ft for adult steelhead.

Thompson acknowledged that "*the relationship between flow conditions on the transect and the relative ability of fish to pass has not been evaluated.*" However, in the absence of an intensive site specific study of migrating fish, practicing fisheries biologists have routinely adopted and modified Thompson's approach to assess minimum passage conditions. In general, for most studies involving adult passage of steelhead, Thompson's minimum depth criterion of 0.6 ft is used as the minimum passage depth. The flow needed to provide this depth across a substantial portion of critically shallow riffles is generally recommended as the minimum bypass flow (or inflow if it is less).

Field methods for the assessment of passage flows on San Francisquito Creek were similar to those described by Thompson (1972). Representatives for Stanford (Carmen Consulting) and NMFS collected stream hydraulic data on San Francisquito Creek during the period May 19-23, 2005. The field effort coincided with an unusually late spring storm event.

During an initial field reconnaissance on May 19, riffle habitats were observed at each of the following locations on San Francisquito Creek when stream flow at the USGS gage on this creek was about 40 cfs:

1. near the footbridge at Stanford West Apartments
2. near the eastern end of the Oak Apartments
3. downstream about 100 yards from the Bonde Weir near the El Camino Real Bridge
4. immediately downstream of the Middlefield Road Bridge
5. immediately downstream of the University Ave. Bridge

We observed two or three riffles at each of these five locations, and then selected one transect at each of the first three sites, for a total of three study transects (Figure 1). Each study transect was established across the most restrictive cross-section at the study site. Transect 1 crossed a riffle about 125 yards upstream from the Stanford West footbridge. Transect 2 was located near the eastern end of the Oak Apartments, and Transect 3 was located about 100 yards downstream from the Bonde Weir, which is immediately downstream from the El Camino Real Bridge.

We judged that fish passage conditions immediately below Middlefield Road and University Ave Bridge were not as difficult at the observed flow as at the upstream three sites. Given this and our limited resources, measurements were not made at the latter two sites. However, the riffles immediately below these two bridges were photographed at flows of about 40 and 6-8 cfs. In addition to these measurements and observations we observed the Bonde Weir located about 100 yards upstream from Transect 3 at each study flow, and we visited and photographed San Francisquito Creek in the vicinity of the Stanford Golf Course near the Stanford diversion station when flow was approximately 20 cfs. At this observed flow, conditions in the segment through the golf course appeared to be less problematic for adult steelhead movements than at Study Transects 1, 2, and 3.

Depths across the study transects on San Francisquito Creek were determined by surveying each transect's bed profile, measuring the water surface elevation at three separate flows, and measuring depth and velocity across each transect at the middle flow (Table 1). The hydraulic component of RHABSIM (Tom R. Paine & Associates' Riverine Habitat Simulation model) was used to interpolate and extrapolate depths and wetted width data at additional flows. At each study flow, we gauged stream flow within about 200 ft of each site to ensure that we had reliable stream flow measurements for the modeling work. All study transects were photographed at each of the three study flows.

Table 1. Estimated stream flows (cfs) at each study transect during field measurements.

Transect	**High flow**	**Middle flow**	**Low flow**
1	40	22	9
2	40	22	9
3	42	20	6

3.0 Results

3.1 Assessment of bypass flows needed to protect steelhead in Los Trancos Creek downstream from the Stanford Diversion Site

Fish migrating upstream must have streamflows that provide suitable water velocity and depths for successful upstream passage (Bjornn and Reiser 1991). In addition, it is important to preserve streamflows that provide adequate depths and velocities supporting suitable and preferred habitats for temporarily resting and more stationary fishes, as well as spawning. The artificial reduction of stream flows can adversely affect steelhead by limiting opportunities for instream migrations and by reducing the quantity and quality of available habitat for steelhead. Therefore, an assessment of bypass flow needs for the Los Trancos diversion facility, should determine the discharge at which: 1) opportunities for juvenile and adult migrations are not diminished, and 2) temporarily resting or stationary fishes are not exposed to increased risk of injury or mortality.

In his evaluation of flows for migrating adult steelhead in Los Trancos Creek, Smith (1995) used a 0.4 ft minimum depth criterion in an adaptation of Thompson's (1972) methods [see Section 2.2 of this report for further discussion of Thompson's method]. Smith states, "*Riffles were judged passable to upstream migrating steelhead if at least a continuous 2 feet of the width of the transect exceeded 0.4 feet in depth and 1.5 feet of the channel exceeded 0.5 feet in depth or 1 foot of the channel exceeded 0.6 feet in depth.*" He also states that "*For this evaluation I considered a depth of 0.4 feet to provide minimal or marginal conditions for passage*." Smith's depth criterion is appreciably lower than Thompson's minimum passage depth criterion for steelhead of 0.6 ft, which is typically used in assessments of passage flows for adult steelhead. Nevertheless, Smith's data can be examined using the standard 0.6 ft depth criterion. His data show that 0.6 ft depths were achieved at most of his study riffles when stream flow was 8 cfs. However, Smith also noted that the stream bed of Los Trancos Creek is highly dynamic, and that major storms produce substantial bedload movement that periodically renders some riffles impassible at 8 cfs. He reports that cases of obstructed passage from mobilized gravels is a temporary problem generally lasting days or perhaps a few weeks, and it is often associated with the release of accumulated sediments upstream of the diversion dam. Smith concludes:

> "*Setting passage requirements based upon such variable streambed and flow/depth relationships is difficult, but it appears that Los Trancos Creek would be passable to upstream migrating steelhead at 8 cfs most of the migration season in most years. However, major storms which produce substantial bedload movement would probably increase the flows needed for adult passage during a portion of the migration period. ... Setting passage flow requirements at greater than 8 cfs would provide for improved passage under some circumstances, but is probably not necessary to insure access by most migrating fish.*

> *Opening of the diversion dam after substantial amounts of sediment have accumulated upstream would also reduce passage conditions in riffles immediately downstream of the diversion for several hours. At flows of 8 cfs the passage conditions would probably be suitable within 8 hours."*

Carmen and White (2004) provided limited corroborative evidence that 8 cfs may be an adequate flow to facilitate passage of adult steelhead in Los Trancos Creek. That study found that 4.3 cfs was inadequate for upstream passage of adults, but "*at 15+ cfs there were clearly no barriers with average depths of one foot or more.*" Carmen and White (2004) cited McBain and Trush (2000) who reported a linear relationship between stream discharge and average minimum passage depth at riffles and runs in selected northcoast California stream channels. That analysis suggested a minimum passage depth of 0.6 feet is generally achieved in small streams when flow is somewhere between 7.5 and 15 cfs.

Carmen and White (2005) provided additional support that 8 cfs is adequate for upstream passage of adults. In that study Carmen and White documented stream depths along the thalweg (*i.e*., the deepest portion of the stream channel) of four riffles located downstream from the diversion structure. That data showed that at a flow of 7.5 cfs, the stream thalweg exceeded 0.6 ft at all points along each of the four measured riffles, and the thalweg of these riffles generally exceeded 0.8 ft deep. These latter measurements do not provide information on the proportion of the channel width that exceeded 0.6 ft deep; however, the prevalence of thalweg depths greater than 0.8 ft suggests that the desired 0.6 ft passage condition was probably met at the studied riffles when flow was 7.5 cfs.

The above information suggests that a bypass flow of 8.0 cfs should adequately protect opportunities for upstream migration by adult steelhead, although Smith's caution regarding barriers formed by mobilized gravels needs to be considered in any bypass flow recommendation for this diversion site. For example, it may be appropriate to monitor gravel deposition in reaches below the diversion site immediately after major storm events (*e.g*., discharge exceeding 150 cfs above the diversion site) or following the opening of the diversion dam after substantial sediments have accumulated. A gradual rampdown from 15 cfs to 8 cfs over several hours would help reestablish a defined thalweg through the gravel. Smith (1995) suggests that this may be accomplished in 8 hours; however, it would be appropriate to collect additional site specific information on this matter before finalizing a long-term ramping rate for the project.

Resource agencies that apply the Thompson method for solving flow-related fish passage problems generally recommend that the resulting "minimum passage flow" (or inflow) be maintained during the period of time when adult fish are migrating. However, in the case of the Los Trancos diversion site, Stanford projected that a continuous minimum bypass flow of 8 cfs, or inflow, would substantially reduce their diversions from historic levels and would have a substantial adverse effect on their water supply (letter from T. Zigterman, Stanford to P. Rutten, NMFS, dated December 8, 2004).

To help address Stanford's concern about the effects of bypass flows for fisheries on its historic water supply for irrigation, we evaluated additional two-stage diversion scenarios in which a bypass flow of 8 cfs would be maintained whenever inflow to the project exceeded 8 cfs, but some water could be diverted when inflow to the project site dropped below 8 cfs. The rationale for these scenarios is that if natural inflow is insufficient to facilitate passage (*i.e*., < 8 cfs), then an 8 cfs minimum bypass flow should be unnecessary and diversions should be allowable. The logic of such a two-stage bypass flow scenario dismisses the potential losses of passage opportunity afforded by suboptimal flows providing maximum depths of 0.4 or 0.5 ft in shallow riffles. It also raises the question of what absolute minimum bypass flow is needed to protect habitats for non-migratory life stages (*e.g*., juvenile steelhead and egg incubation) and other species, as well as migratory adult steelhead temporarily holding in pools downstream from the diversion site. Thus, a two-stage bypass flow scenario requires the assumption that lost opportunity for upstream passage at suboptimal flows is acceptable, and it necessitates a second, lower minimum bypass flow triggered when natural inflow is less than 8 cfs. This two-stage approach is recommended for this project because of the importance of both mitigating the impacts of Stanford's diversions upon fisheries resources and minimizing the adverse effects of operational changes upon Stanford's historic water supply for irrigation.

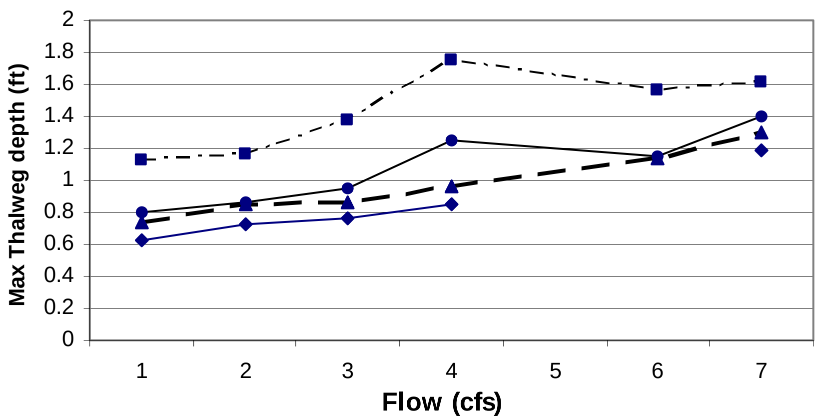
To determine the minimum bypass flow for periods when inflow is less than 8 cfs, NMFS and DFG evaluated Carmen and White's 2005 video recording of habitat conditions at several riffles and pools when stream flows ranged from 1 to 7.5 cfs. Stream transect data collected by Carmen and White (2004; 2005) were also useful in the assessment of the lower stage minimum flow.

Carmen and White's systematic video recording show incremental increases in the current velocities on pool surfaces and in the shallow riffles. As the current velocities increase, the surface turbulence becomes more intense and extends to a greater area of the pool surfaces. This surface turbulence provides important cover for fishes located in pools (Raleigh 1982; Raleigh et al. 1984). The value of elevated surface turbulence as cover for stream-dwelling salmon and steelhead has been recognized by many researchers (Jenkins 1969; Griffith 1972; Everest and Chapman 1972; Gibson 1978; Bjornn and Reiser 1991). Johnson et al. (1998) developed a classification system for rating the habitat value of various levels of surface turbulence, and the Federal Highway Administration acknowledges the role of surface turbulence as cover for fishes within pools (FHWA 2004). In Los Trancos Creek, most of the pools are relatively shallow (< 3 ft deep), and surface turbulence provides important cover from potential predators, including human poachers.

DFG and NMFS biologists, who reviewed the video-recording, concurred that a flow of 6 cfs nearly maximizes the value of surface turbulence as cover for steelhead. These biologists also found that a flow of 4 cfs provides substantial turbulence, but with a lower habitat value than occurs at 6 cfs. At flows of 1 and 2 cfs, surface turbulence is minimal, and the bottoms of pools are readily observable. At these lower flows, fishes would be much more noticeable to predators than at the higher flows. The video-recording shows that 3 cfs is a transitional flow in which surface turbulence begins to become a habitat factor; however, it is much less evident than at the higher flows.

The relationship between riffle depths and stream discharge may provide some insight into the reason for the noticeable increased turbulence observed beginning at about 4 cfs. A basic principle of surface hydraulics is that substrate roughness has less effect (*i.e*., less drag) on stream current velocities as flow increases. Thalweg depth data collected by Carmen and White (2005) show that riffle depths noticeably rise as flow increases to 4 cfs; but then the rate of change in depth tails off markedly at higher flows (Figure 2). Although these data probably have inherent measurement error (how else to explain a drop in depth at higher flows?), they do suggest that depths did not increase as fast after flow reached 4 cfs. To balance the slowed rate of change in depth with an increasing discharge, there is an increased rate of change in velocity at the higher flows. Those higher velocities produce the surface turbulence providing important cover to fishes and other aquatic organisms.

Figure 2. Maximum thalweg depth at four riffles in Los Trancos Creek (data from Carmen & White 2005)



The consensus of NMFS and DFG biologists who reviewed the systematic video recording of alternative flows in Los Trancos Creek was that a minimum bypass flow of 5 cfs or inflow (whichever is less) should provide adequate protection for fisheries when natural inflow to the diversion site is less than 8 cfs. In addition to having adequate surface turbulence, a flow of 5 cfs provides greater riffle and pool depths, increased riffle velocities and pool volumes, and it likely provides greater riffle widths than lower flows.

It has been argued that natural flows in Los Trancos Creek are often less than 5 cfs and that lower flows limit the population, and thus little benefit is accrued by maintaining a minimum flow of 5 cfs. However, during relatively wet winters, such as Water Year 1999, unimpaired inflow to the diversion site exceeded 5 cfs during most of the winter (Stanford University stream gauge data). In addition, it is important to limit the duration of time that fishes are exposed to the potential higher risk of predation that occurs at lower flows. During more normal years, a minimum bypass flow of 5 cfs would reduce the duration of time that fishes are exposed to lower flows. For example, a migratory steelhead stopping to rest in a pool below the diversion site would be exposed to low flows and the associated higher risk of predation for a shorter time with a 5 cfs bypass flow, than if a lower minimum bypass flow is adopted.

Another benefit of a 5 cfs minimum bypass flow is that it will enhance passage conditions for downstream migrating smolts relative to historic operations. Seaward smolt migrations of steelhead and salmon often coincide with increases in water discharge (White and Huntsman 1938; Allen 1944; Osterdahl 1969; Raymond 1979; Northcote 1984). Relatively large freshets also appear to cause large downstream movements of juvenile coho salmon (Chapman 1965). It is well documented that stream flow affects the travel rates of migrating smolts. Smolt migration is largely a passive process (Thorpe and Morgan 1978; Fried et al. 1978; Thorpe et al. 1981). Fried et al. (1978) reported that water current was the main factor influencing routes and rates of smolt movements. Berggren and Filardo (1993), who examined the time that it takes juvenile steelhead to migrate through reaches in the Snake and Columbia rivers, reported that estimates of smolt travel time for yearling steelhead were inversely related to average river flows. Moreover, delays in the rate of downstream movement can influence smolt survival. Cada et al. (1994) concluded that relevant studies "*generally supported the premise that increased flow led to increased smolt survival*." Therefore, contrary to Smith (1995) who stated that "*a continous pathway 1 foot wide and 0.35 feet deep may be sufficient to provide passage*" and Carmen and White's (2004) statement that "*flows of 1.0 cfs or higher provided adequate depths in riffles (including critical riffles) so that no barriers to outmigration of juveniles were present in the creek*", successful migrations of steelhead in Los Trancos Creek would be better protected by conserving elevated flows and providing effective screening at the diversion facility.

In summary, steelhead would benefit from a two-stage minimum bypass flow at the Stanford diversion facility. Upstream migration of adult steelhead would be generally facilitated and protected by a continuous minimum flow of 8 cfs whenever inflow to the diversion facility exceeds 8 cfs. When inflows to the project site are less than 8 cfs, a minimum bypass flow of 5 cfs, or inflow, should be maintained to protect resting migrants and more stationary individuals. Bed load movement at high flows may cause the formation of temporary passage barriers (gravel bars) that are impassible at 8 cfs. However, monitoring could be initiated to identify such passage problems and these problems may be solved through the gradual ramp down of flows during diversion operations. The ramping rates (*e.g.*, duration and magnitude of intermediate flows) for this project should be empirically determined.

3.2 Assessment of bypass flows needed to protect steelhead downstream from the Stanford diversion site on San Francisquito Creek

Water diversions from San Francisquito Creek can potentially affect depths, velocities, and channel geometry in San Francisquito Creek. These changes can affect the availability and quality of habitats for steelhead and other aquatic species. Our assessment examined the effect of alternative stream flows on depths across shallow riffles that are potential barriers to migration. This assessment also considered minimum bypass flows needed to maintain habitat for resting adult steelhead and other more stationary fish and other aquatic species.

3.2.1 *Passage flows at riffles and other barriers on San Francisquito Creek*

The stream discharge meeting Thompson's 0.6 criteria differed markedly at the riffle transects measured in May 2005. The flow needed to meet the Thompson criteria was much higher at Transect 3 than at the other two sites. At Transects 1 and 2, the minimum depth criteria of 0.6 feet for 25% of the wetted channel were met by flows of approximately 15 to 16 cfs (Table 2). At Transects 1 and 2, a contiguous 10% of the wetted cross-section met the minimum depth criterion at flows of 9 and 14 cfs, respectively. These results contrasted sharply with those at Transect 3 where 25% of the wetted cross-section did not meet the minimum depth criteria of 0.6 ft across 25% of the channel (with 10% contiguous) until flows were over 60 cfs.

The reason for the disparity in the passage flows needed at the study transects is unclear; however, Transect 3 crossed a wide natural riffle located in a stream reach much affected by artificial structures. Transect 3 was located about 100 yards downstream from the Bonde Weir and it was immediately upstream (<20 yards) of a river bend with a stream bank that is stabilized with a high wall of rock-filled gabions. To further evaluate passage conditions at Transect 3, results were also calculated using a minimum depth criterion of 0.5 feet. This alternative depth criterion was applied because it appeared that steelhead passage opportunity remained possible, if not optimal, at the observed flow of 42 cfs when depths across the transect were almost uniformly 0.5 ft. A less restrictive standard was also applied at Transect 3 because it was recognized that Thompson's method involves an averaging of results, and yet it was important to make sure that Transect 3 would not become a true adult passage barrier due to project minimum flows leaving maximum depths of only 0.4 feet or less. At Transect 3 the minimum depth criteria of 0.5 feet for 25% of the wetted channel was met by a flow of approximately 42 cfs, and a contiguous 10% of the wetted cross-section was at least 0.5 feet deep at a flow of 34 cfs (Table 3).

Table 2. Total width and percentage of Transects 1 and 2 with depth greater than 0.6 ft.

Transect	**Flow (cfs)**	**Total Cross-section width > 0.6 ft deep (ft)**	**Wetted width > 0.6 ft deep (%)**	**Largest contiguous width > 0.6 ft deep (ft)**
1	7	0	0	0
	9	4	15	4
	10	4	14.7	4
	12	6	19	6
	14	6	18.6	6
	16	9.75	29.3	9.75
2	7	0	0	0
	9	1	7	1
	10	1	6.8	1
	12	2	13	1 (6.5% ww)[a]
	14	3	19.5	2 (13% ww)
	16	4	25.3	2 (12.6% ww)
	18	5	31	3 (18.6% ww)

[a]ww = wetted width

Table 3. Total width and percentage of Transect 3 with depth greater than 0.5 ft

Transect	**Flow (cfs)**	**Total Cross-section width > 0.5 ft deep (ft)**	**Wetted width > 0.5 ft deep (%)**	**Largest contiguous width > 0.5 ft deep (ft)**
3	24	2	5.2	2
	28	3.5	6.5	2
	30	5	9.8	3
	34	6.75	14.7	6.75
	38	8.50	22.0	9.25
	40[a]	9.25	24	9.25
	44	9.88	25.5	9.25

[a]At 40 cfs, depths reach 0.6 ft across a two foot wide band on this transect.

The transect data suggest that upstream migration of adult steelhead in San Francisquito Creek is constrained by more than one flow condition. Data collected at Transects 1 and 2, together with observations at reaches in the Stanford Golf Course and below Middlefield Road and University Avenue bridges, indicate that passage becomes difficult at most natural riffles when flow drops below 16 cfs. However, a more formidable barrier to steelhead movements is the single shallow riffle at Transect 3 where flows of at least 34 to 40 cfs are needed for successful upstream migrations. It is worth noting that even with a flow of 34 to 40 cfs, the standard minimum depth and width criteria (0.6 ft for 10% contiguous width) are not met.

In addition to the natural riffles examined during this survey, the Bonde Weir is another serious barrier to upstream movements of steelhead. Smith and Harden (2001) state,

> *"Because the weir spreads the flow across most of the channel and is inclined, it presents substantial velocity and depth problems for passage. Very difficult passage is probably possible at 30 cfs, but 100+ cfs is probably necessary for most fish. The barrier is probably regularly passable only during storms in most years.*

Based on our study team's observations of the weir at flows of about 40, 20 and 6 cfs, we concur with Smith and Harden's assessment that passage is very difficult, but may be possible for some tenacious and highly motivated fish at flows of about 30 to 50 cfs.

The Bonde Weir has been the subject of investigations and considered for modification to minimize its impact to upstream fish movements. In March 2005, The San Francisco Bay Salmonid Habitat Restoration Fund granted $156,000 to the City of Menlo Park to design and remedy fish passage at this location. An additional $70,000 has been granted to Menlo Park by the NOAA Restoration Center for this project.

Smith and Harden (2001) also listed the USGS gauge weir located 0.1 mile upstream of Junipero Serra Boulevard as a significant obstacle to steelhead movement. Smith and Harden recommend important measures for mitigating this impact to steelhead migration.

3.2.2 Recommended Minimum Bypass Flows for Stanford's Water Diversions from San Francisquito Creek

This assessment of bypass flow needs for the Stanford diversion facility on San Francisquito Creek is motivated by the need to increase bypass flows below Stanford's Los Trancos Creek diversion and provide for the capture of that flow at Stanford's downstream diversion intake on San Francisquito Creek. Through the coordinated use of Stanford's two points of water diversion, alternative operations will allow for Stanford to obtain adequate volumes of water for its irrigation practices without causing undue adverse impacts to the run of steelhead in Los Trancos Creek. As such, this assessment requires balancing and minimizing potential adverse effects to aquatic life in both creeks as well as Stanford's water supply for irrigation. Situated in a rural environment and in a watershed largely owned by Stanford, Los Trancos Creek has been generally protected from development. As a result it supports one of the few remaining runs of steelhead trout in South San Francisco Bay. In contrast, San Francisquito Creek flows through a more urban setting including Stanford's campus, and the cities of Menlo Park and Palo Alto. Water temperatures and sedimentation of its substrates render San Francisquito Creek much less suitable as habitat for steelhead spawning and juvenile rearing than Los Trancos Creek. However, lower San Francisquito Creek remains an important migratory corridor for steelhead between late December and early June.

To limit the effects of water diversions from San Francisquito Creek on steelhead, diversion operations should be maintained with both an absolute minimum bypass flow and constraints on rates of diversion at higher flows. A minimum flow would conserve juvenile rearing habitat, holding pools for adults, and habitats for other aquatic biota. Passage opportunity for steelhead could be protected by limiting the rate of diversion when natural flows approach critical passage thresholds at two categories of barriers.

A minimum bypass flow for Stanford's diversion should be adequate to protect stationary fish (*e.g.*, migratory adults resting in pools) and resident individuals (rearing juveniles and non-migratory species), and it should be set at a level that affords Stanford opportunity to divert water and offset lost opportunities to divert water from Los Trancos Creek. At the observed flows of 6 to 9 cfs, pools and run habitat maintained depths that are probably, if not optimal, at least adequate for juvenile and adult steelhead. Therefore, a minimum bypass flow in the vicinity of 5 to 10 cfs should provide reasonable stream protection for San Francisquito Creek, especially in the context of a plan to reduce diversions and mitigate impacts to Los Trancos Creek.

A flow of 5 cfs is recommended as a minimum bypass flow for Stanford's diversion facility on San Francisquito Creek, because 1) it would likely maintain substantial depth in the stream's pools during the winter and spring, and 2) a higher, more protective bypass flow would restrict additional diversions from San Francisquito Creek that would offset Stanford's reduced diversions on Los Trancos Creek. A flow of 5 cfs is not consistently available at the Stanford diversion on San Francisquito Creek, and in dry years flow is generally less than 5 cfs. For example, at the USGS gage on this creek, flows of 5 cfs or greater are exceeded only 56% of the time over the long-term between December 1 and April 30th (Table 4). This means that flows in San Francisquito Creek are less than 5 cfs 44% of the time during Stanford's licensed season of diversion. Data for the wettest period of the winter (February 1-March 31) show that 5 cfs is equaled or exceeded only 65% of the time between February 1 and March 31. Therefore recommendations for an even higher minimum flow would further constrain Stanford's ability to obtain water that would offset its reduced diversions from Los Trancos Creek.

Table 4. Percentage of time that average daily flow exceeds discharge of 3 to 15 cfs during two periods for 70 years of record (USGS gage on San Francisquito Creek, water years 1930 to 1999).

Flow (cfs)	% exceedence Dec 1-Apr 30	% exceedence Feb 1-March 31
3	62	70
5	56	65
7	51	60
9	47	56
11	45	53
13	42	50
15	40	48

A minimum flow of 5 cfs would not facilitate upstream passage of adult steelhead; however, this issue could be addressed by constraints on diversion rates. Adult fish are probably able to negotiate most riffles and reaches of San Francisquito Creek when flow is at least 16 cfs, and passage at these riffles is probably more difficult at flows of about

12 to 15 cfs. The riffle at Transect 3 and the Bonde Weir are unusually difficult barriers that require flows of at least 34 to 40 cfs for successful passage. When flows approach these two principal thresholds, diversion rates could be reduced or stopped in order to avoid impacts to migrating steelhead. For example, relatively high rates of diversion, such as 5 to 8 cfs, should be avoided when flows are between 17 and 24 cfs and when flows are between 41 and 46 cfs. When inflow is at the two critical thresholds for steelhead passage (*i.e.*, 12 to16 cfs and 34 to 40 cfs), diversions should cease.

Diversion operations with an absolute minimum bypass flow and a variable diversion rate would help accomplish the twin objectives of protecting steelhead passage and increasing water supply from San Francisquito Creek. The analysis of passage conditions at the shallow riffles in San Francisquito Creek indicate that maximum diversion rates of 8 cfs should be avoided when flows are in the vicinity of the critical passage thresholds of 12 to 24 cfs and 34 to 46 cfs. Table 5 provides a possible operational scheme that would substantially mitigate the effects of increased water diversions from San Francisquito Creek on steelhead migrations. This operational plan would not avoid all impacts to steelhead passage; however, it would substantially limit the effects of additional diversions when flows are near the observed critical passage thresholds. Allowing diversions under this scheme would help facilitate reductions in diversions from Los Trancos Creek, which supports important year round habitat for steelhead.

Table 5. A proposed operational plan for water diversions from San Francisquito Creek at the Stanford diversion facility. Stream flow is discharge at the USGS Gauge near Stanford.

Stream flow (cfs)	**Max Diversion Rate (cfs)**	**Stream flow (cfs)**	**Max Diversion rate (cfs)**
0-5	0	24	8
6	1	25	8
7	2	26	8
8	3	27	8
9	4	28	8
10	5	29	8
11	6	30	8
12-16	0	31	8
17	1	32	8
18	2	33	8
19	3	34-40	0[a]
20	4	41-46	4[a]
21	5	47	8
22	6	48	8
23	7	>49	8

[a]Maximum instantaneous pumping rate could be increased to 8 cfs over this range of flow if the riffle at Transect 3 is modified and able to successfully pass adult steelhead between flows of 16 and 40 cfs and Bonde Weir is modified to successfully and efficiently pass adult steelhead at flows of 16 to 100 cfs.

4.0 Discussion

Stanford's planned modifications of its water diversion facility on Los Trancos Creek will include an improved fish ladder structure, but it also poses a significant risk to the creek's steelhead run due to the facilities increased water diversion efficiency. Prior to collaborative discussions with Stanford, the proposed project would greatly enhance the efficiency of the diversion structure to annually divert water at a rate of up to 40 cfs between December 1 and May 1, with a minimum bypass flow of 8 cfs when inflow exceeds 8 cfs and if inflow is less than 8 cfs a minimum bypass flow of 0.5 cfs in December and 1 cfs from January 1 to May 1. The plan to divert water down to a stream flow of 0.5 or 1 cfs would reduce the low flows that create important habitat and refuge for juvenile and adult steelhead and other aquatic species. However, these potential impacts would be substantially mitigated if the project were operated with a minimum bypass flow of 8 cfs when inflow exceeds 8 cfs, and a minimum bypass flow of 5 cfs when inflow is less than 8 cfs (see Section 3.1). In addition to a higher minimum flow, it is strongly recommended that a ramping rate be evaluated and established for future diversions from Los Trancos Creek to ensure that quick reductions in flow do not leave impassible shoals of gravel following storm events.

These recommendations for a higher minimum flow for the Los Trancos diversion facility would limit the volume of Los Trancos Creek water available to Stanford for its historic irrigation practices. However, reductions in Stanford's diversions from Los Trancos Creek during low flows could be offset by increased diversions at Stanford's existing diversion facility located downstream on San Francisquito Creek where natural flow is much higher during winter months. The assessment of flows needed to protect steelhead in San Francisquito Creek indicate that diversions of up to 8 cfs could be implemented without undue impacts to fisheries and aquatic habitats if minimum bypass flows are maintained and the project is operated with carefully controlled variable rates of diversion (see Table 5).

The recommended diversion plan with a higher minimum flow at the Los Trancos Creek point of diversion and increased diversions from the San Francisquito Creek diversion site represents a compromise that will help protect and conserve the high quality stream habitats present in Los Trancos Creek, while diminishing a minor portion of flow in San Francisquito Creek. The impacts of higher diversion rates from the latter stream would be mitigated by maintenance of the minimum bypass flow (5 cfs) and restrictions on the rates of diversion. In addition, it is worth pointing out that conservation of low flows (*i.e*., 1-5 cfs) in Los Trancos Creek would augment inflow to San Francisquito Creek during periods of low flow. That additional flow from Los Trancos Creek would not have reached San Francisquito Creek under historic operations; and therefore, the effects of higher diversions from San Francisquito Creek would be partially mitigated by the increased inflow from Los Trancos Creek.

The potential volume of water that might be diverted from San Francisquito Creek under an operational scenario such as presented in Table 5 can be estimated using historic

USGS data for this creek together with the diversion scenario's operational constraints. The USGS gage data for San Francisquito Creek are especially useful for such an analysis because of the close proximity of the gage station and Stanford's diversion structure, and the lack of intervening diversions or tributary inflow between the two sites. One approach to estimating potential water yield would be to apply the diversion scenario's maximum rates of diversion and minimum flow requirements (*e.g.*, see Table 5) to the historic San Francisquito Creek flow data. Such an estimate would not include the potential additional yield of water from San Francisquito Creek that would result from the higher minimum flow requirements at the Los Trancos diversion site. The above estimation procedure would also not include possible lost yield due to operational limitations (*e.g.*, mechanical malfunctions or power outages).

Appendix Table A-1 shows the potential water yield that would have been available from the San Francisquito Creek diversion during the winter months of Water Years 1999 to 2004 based on the diversion scenario in Table 5, not including the additional yield due to reduced diversions from Los Trancos Creek and without consideration of the lost yield due to operational limitations. This analysis was done for only these six years, because in discussions with Stanford, water years 1999 to 2004 were problematic for balancing water supply and higher bypass flows at the Los Trancos diversion site. Earlier water years for which there are flow data for Los Trancos Creek (WY1995-1998) were considerably wetter, and NMFS bypass flow recommendations for Los Trancos Creek were of less impact to potential water supply.

Table A-1 shows that under flow conditions similar to Water Years 1999 to 2004, Stanford could divert approximately 610 to 1297 acre feet of water using the operational plan identified in Table 5. Those volumes do not include the additional yield that would likely result from raising the minimum bypass flow at the Los Trancos diversion site. However, it also does not account for potential lost yield due to mechanical limitations and related downtimes.

The accuracy of these estimates of Stanford's estimated yields from San Francisquito can be evaluated using Stanford's own analysis of water yield from SF Creek using the operations plan outlined in Table 5. Stanford estimated the potential theoretical yield from San Francisquito Creek for a single water year (2004) using alternative assumptions (Stanford 2005). Stanford's calculations of estimated yield from San Francisquito Creek included consideration of 1) the additional flow to San Francisquito Creek due to higher bypass flows at the diversion on Los Trancos Creek, and 2) alternative scenarios assuming no mechanical downtime and a 20% downtime (Table 6). Stanford's estimates of potential yield are highly dependent on the duration of facility downtime during high flow events. However, these estimates corroborate the approximate volumes of potential yield from San Francisquito Creek shown in Table A-1 for water years 1999 through 2003 (1297, 1095, 691, 942, and 919 acre-feet, respectively).

Table 6. Estimated potential water yield (acre-feet) from San Francisquito Creek during Water Year 2004 under operational conditions identified in Table 5 of this report.

NMFS estimate per Table A-1	**Stanford estimate w/out downtime**	**Stanford estimate w/ 20% downtime**
610	715	572

Any final plan for bypass flows for Stanford's diversions from Los Trancos Creek and San Francisquito Creeks will need to consider the constraints of facility operations. Manual settings of bypass flows would be impractical and inappropriate because of the dependency on personnel at all times of the day and night during storm events. In order to divert from Los Trancos Creek when flow is between 5 and 8 cfs, the facility will need to be automated and be able to distinguish two levels of inflow (>8 cfs and <8 cfs) and then shift between minimum bypass flows of 5 cfs and 8 cfs. Likewise, in order to achieve the objectives of diversion consistent with the schedule shown in Table 5, the San Francisquito Creek diversion facility will need to be able to monitor stream inflow and synchronize rates of diversion so that no water is diverted when inflow is less than 5 cfs, nor would diversions occur at inflows of 12 to16 cfs or 34 to 40 cfs. In addition, diversion rates will need to precisely ramp down from 8 cfs to 1 cfs as inflow approaches the three critical thresholds. Due to technical considerations, the diversion schedule for San Francisquito Creek may need to be accomplished through an alternative modified schedule with less flexibility in pumping rates (*e.g.*, instantaneous pumping rates of only 2, 4, or 8 cfs) to allow the previously described bypass flows to be maintained.

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Appendix A

Estimated Theoretical Water Yield for Stanford from San Francisquito Creek during Water Years 1999 to 2004 Based on the Rates of Withdrawal and Minimum Flow schedule in Table 5

Table A-1 San Francisquito Creek yield with NMFS bypass flows and max diversion of 8 cfs
Assumes that no additional inflow from Los Trancos due to higher min flows in Los Trancos

		WY 1999			WY 2000			WY 2001	
DATE	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yiel**
1-Dec	50	8	15.84	2.4	0	0	1.9	0	
2-Dec	15	0	0	1.4	0	0	1.6	0	
3-Dec	23	7	13.86	1.1	0	0	1.5	0	
4-Dec	17	1	1.98	0.95	0	0	1.5	0	
5-Dec	14	0	0	0.94	0	0	1.5	0	
6-Dec	27	8	15.84	0.8	0	0	1.8	0	
7-Dec	12	0	0	0.72	0	0	2.1	0	
8-Dec	9.2	4	7.92	0.66	0	0	2	0	
9-Dec	7.9	2	3.96	0.99	0	0	2	0	
10-Dec	7	2	3.96	1.1	0	0	2.1	0	
11-Dec	6.5	1	1.98	1	0	0	2.1	0	
12-Dec	6.1	1	1.98	1.1	0	0	2.8	0	
13-Dec	6.5	1	1.98	1.3	0	0	3.8	0	
14-Dec	8.9	3	5.94	1.5	0	0	5.4	0	
15-Dec	6.7	1	1.98	1.5	0	0	8.7	3	
16-Dec	6.1	1	1.98	1.4	0	0	7.1	2	
17-Dec	5.5	0	0	1.4	0	0	5.2	0	
18-Dec	5.1	0	0	1.4	0	0	4.2	0	
19-Dec	4.9	0	0	1.4	0	0	3.6	0	
20-Dec	6.2	1	1.98	1.4	0	0	3.2	0	
21-Dec	6	1	1.98	1.4	0	0	3.1	0	
22-Dec	5	0	0	1.3	0	0	2.9	0	
23-Dec	4.9	0	0	1.3	0	0	2.9	0	
24-Dec	4.8	0	0	1.2	0	0	2.8	0	
25-Dec	4.7	0	0	1.2	0	0	2.6	0	
26-Dec	4.7	0	0	1.2	0	0	2.6	0	
27-Dec	4.7	0	0	1.2	0	0	2.4	0	
28-Dec	4.7	0	0	1.2	0	0	2.4	0	
29-Dec	4.5	0	0	1.2	0	0	2.4	0	
30-Dec	4.5	0	0	1.2	0	0	2.4	0	
31-Dec	4.4	0	0	1.2	0	0	2.4	0	
1-Jan	4.2	0	0	1.2	0	0	2.4	0	
2-Jan	4.2	0	0	1.2	0	0	2.3	0	
3-Jan	4	0	0	1.3	0	0	2.2	0	
4-Jan	3.9	0	0	1.3	0	0	2.2	0	
5-Jan	3.8	0	0	1.3	0	0	2.1	0	
6-Jan	3.8	0	0	1.3	0	0	2.1	0	
7-Jan	3.9	0	0	1.2	0	0	2.1	0	
8-Jan	3.8	0	0	1.1	0	0	8.6	3	
9-Jan	3.8	0	0	1.1	0	0	5.1	0	
10-Jan	3.6	0	0	1.3	0	0	53	8	
11-Jan	3.6	0	0	7.1	2	3.96	101	8	
12-Jan	3.6	0	0	8.6	3	5.94	43	4	

	WY 1999			WY 2000			WY 2001		
DATE	USGS Q	Yield (cfs)	Yield (af)	USGS Q	Yield (cfs)	Yield (af)	USGS Q	Yield (cfs)	Yield
13-Jan	3.6	0	0	4.1	0	0	13	0	
14-Jan	3.4	0	0	3.2	0	0	8.6	3	
15-Jan	3.5	0	0	2.7	0	0	6.7	1	
16-Jan	6.4	1	1.98	43	4	7.92	5.6	1	
17-Jan	5.3	0	0	11	6	11.88	4.9	0	
18-Jan	172	8	15.84	51	8	15.84	4.3	0	
19-Jan	208	8	15.84	17	1	1.98	3.8	0	
20-Jan	579	8	15.84	11	6	11.88	3.6	0	
21-Jan	138	8	15.84	6.7	1	1.98	3.6	0	
22-Jan	46	4	7.92	5.3	0	0	3.4	0	
23-Jan	203	8	15.84	98	8	15.84	4.9	0	
24-Jan	70	8	15.84	886	8	15.84	10	5	
25-Jan	40	0	0	257	8	15.84	81	3	
26-Jan	56	8	15.84	51	8	15.84	69	8	
27-Jan	42	4	7.92	26	8	15.84	20	4	
28-Jan	29	8	15.84	15	0	0	11	6	
29-Jan	23	7	13.86	12	0	0	8.1	3	
30-Jan	21	5	9.9	22	6	11.88	6.3	1	
31-Jan	106	8	15.84	17	1	1.98	5.8	1	
1-Feb	44	4	7.92	12	0	0	5.7	0	
2-Feb	30	8	15.84	11	6	11.88	5.6	0	
3-Feb	25	8	15.84	24	8	15.84	5.2	0	
4-Feb	21	5	9.9	20	4	7.92	4.7	0	
5-Feb	19	3	5.94	16	0	0	4.4	0	
6-Feb	62	9	17.82	14	0	0	4.1	0	
7-Feb	1260	9	17.82	10	5	9.9	3.8	0	
8-Feb	391	9	17.82	9	4	7.92	3.5	0	
9-Feb	1010	9	17.82	8.4	3	5.94	22	6	
10-Feb	269	9	17.82	30	8	15.84	105	8	
11-Feb	123	9	17.82	317	8	15.84	234	8	
12-Feb	84	9	17.82	449	8	15.84	138	8	
13-Feb	65	9	17.82	1290	8	15.84	58	8	
14-Feb	58	9	17.82	1340	8	15.84	27	8	
15-Feb	46	4	7.92	243	8	15.84	18	2	
16-Feb	183	8	15.84	119	8	15.84	15	0	
17-Feb	485	8	15.84	87	8	15.84	19	3	
18-Feb	195	8	15.84	63	8	15.84	49	8	
19-Feb	143	8	15.84	48	8	15.84	115	8	
20-Feb	154	8	15.84	63	8	15.84	82	8	
21-Feb	341	8	15.84	73	8	15.84	53	8	
22-Feb	130	8	15.84	201	8	15.84	165	8	
23-Feb	95	8	15.84	486	8	15.84	342	8	
24-Feb	82	8	15.84	115	8	15.84	194	8	
25-Feb	172	8	15.84	86	8	15.84	102	8	
26-Feb	91	8	15.84	63	8	15.84	50	8	
27-Feb	73	8	15.84	184	8	15.84	33	8	
28-Feb	63	8	15.84	186	8	15.84	26	8	
29-Feb	--	0	0	190	8	15.84	--	0	

		WY 1999			WY 2000		WY 2001		
DATE	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yiel**
1-Mar	55	8	15.84	129	8	15.84	20	4	
2-Mar	43	4	7.92	88	8	15.84	19	3	
3-Mar	56	8	15.84	75	8	15.84	17	1	
4-Mar	45	4	7.92	71	8	15.84	137	8	
5-Mar	41	4	7.92	113	8	15.84	191	8	
6-Mar	38	0	0	89	8	15.84	81	8	
7-Mar	37	0	0	65	8	15.84	46	4	
8-Mar	40	0	0	232	8	15.84	34	0	
9-Mar	136	8	15.84	291	8	15.84	32	8	
10-Mar	63	8	15.84	150	8	15.84	27	8	
11-Mar	47	8	15.84	105	8	15.84	23	7	
12-Mar	37	0	0	85	8	15.84	20	4	
13-Mar	33	8	15.84	66	8	15.84	16	0	
14-Mar	43	4	7.92	58	8	15.84	14	0	
15-Mar	88	8	15.84	49	8	15.84	13	0	
16-Mar	48	8	15.84	43	4	7.92	12	0	
17-Mar	37	0	0	37	0	0	11	6	
18-Mar	34	0	0	34	0	0	10	5	
19-Mar	38	8	15.84	32	8	15.84	11	6	
20-Mar	36	0	0	30	8	15.84	11	6	
21-Mar	34	0	0	27	8	15.84	8.4	3	
22-Mar	31	8	15.84	25	8	15.84	7	2	
23-Mar	41	4	7.92	24	8	15.84	6.8	2	
24-Mar	34	0	0	22	6	11.88	7	2	
25-Mar	129	8	15.84	21	5	9.9	17	1	
26-Mar	61	8	15.84	19	3	5.94	10	5	
27-Mar	44	4	7.92	17	1	1.98	7.9	2	
28-Mar	36	0	0	13	0	0	7.2	2	
29-Mar	33	8	15.84	12	0	0	6.7	1	
30-Mar	32	8	15.84	12	0	0	6.4	1	
31-Mar	52	8	15.84	11	6	11.88	5.9	0	
1-Apr	35	0	0	11	6	11.88	5.9	0	
2-Apr	30	8	15.84	10	5	9.9	5.7	0	
3-Apr	26	8	15.84	10	5	9.9	5.6	0	
4-Apr	25	8	15.84	9.8	5	9.9	5.4	0	
5-Apr	88	8	15.84	9.6	5	9.9	5.3	0	
6-Apr	162	8	15.84	9.6	5	9.9	7.9	3	
7-Apr	74	8	15.84	9.6	5	9.9	22	6	
8-Apr	147	8	15.84	9.3	4	7.92	11	6	
9-Apr	94	8	15.84	9.3	4	7.92	9.4	4	
10-Apr	63	8	15.84	9.2	4	7.92	7.6	2	
11-Apr	183	8	15.84	8.9	4	7.92	6.5	1	
12-Apr	98	8	15.84	9.1	4	7.92	5.8	0	
13-Apr	68	8	15.84	16	0	0	5.2	0	
14-Apr	59	8	15.84	12	0	0	4.8	0	
15-Apr	50	8	15.84	12	0	0	5.1	0	
16-Apr	41	4	7.92	11	6	11.88	4.9	0	
17-Apr	35	0	0	39	0	0	4.2	0	
18-Apr	33	8	15.84	19	3	5.94	4.3	0	

	WY 1999			WY 2000			WY 2001		
DATE	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yiel**
19-Apr	30	8	15.84	12	0	0	4.1	0	
20-Apr	29	8	15.84	10	5	9.9	17	1	
21-Apr	25	8	15.84	9.3	4	7.92	24	8	
22-Apr	20	4	7.92	9.6	4	7.92	10	5	
23-Apr	19	3	5.94	9.5	4	7.92	7.3	2	
24-Apr	18	2	3.96	9.2	4	7.92	5.9	1	
25-Apr	17	1	1.98	8.7	4	7.92	5.1	0	
26-Apr	17	1	1.98	7.3	2	3.96	4.6	0	
27-Apr	15	0	0	6.8	2	3.96	3.5	0	
28-Apr	15	0	0	6.6	2	3.96	2.7	0	
29-Apr	14	0	0	7.2	2	3.96	2.7	0	
30-Apr	15	0	0	7.1	2	3.96	3	0	
		1999Total:	**1297 af**		**2000Total:**	**1095 af**		**2001Total:**	

	WY 2002			WY 2003			WY 2004		
DATE	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yiel**
1-Dec	11	6	11.88	1.2	0	0	1.5	0	
2-Dec	350	8	15.84	1.2	0	0	2.3	0	
3-Dec	59	8	15.84	1.2	0	0	1.4	0	
4-Dec	19	3	5.94	1.2	0	0	0.94	0	
5-Dec	13	0	0	1.2	0	0	1	0	
6-Dec	17	1	1.98	1.2	0	0	3.4	0	
7-Dec	13	0	0	1.6	0	0	9.9	4	
8-Dec	9.8	4	7.92	1.6	0	0	2	0	
9-Dec	10	5	9.9	1.9	0	0	2	0	
10-Dec	8.2	3	5.94	3	0	0	14	0	
11-Dec	7	2	3.96	1.9	0	0	10	5	
12-Dec	6.1	1	1.98	1.7	0	0	2.6	0	
13-Dec	5.5	0	0	98	8	15.84	1.7	0	
14-Dec	70	8	15.84	353	8	15.84	21	5	
15-Dec	23	7	13.86	224	8	15.84	4.5	0	
16-Dec	13	0	0	1010	8	15.84	2.4	0	
17-Dec	38	0	0	142	8	15.84	1.9	0	
18-Dec	28	8	15.84	47	8	15.84	1.6	0	
19-Dec	16	0	0	308	8	15.84	2.6	0	
20-Dec	167	8	15.84	345	8	15.84	4.9	0	
21-Dec	255	8	15.84	124	8	15.84	3.9	0	
22-Dec	77	8	15.84	46	4	7.92	2.2	0	
23-Dec	54	8	15.84	28	8	15.84	2	0	
24-Dec	30	8	15.84	20	4	7.92	16	0	
25-Dec	22	6	11.88	16	0	0	20	4	
26-Dec	17	1	1.98	14	0	0	7.5	2	
27-Dec	16	0	0	13	0	0	3.2	0	
28-Dec	36	0	0	165	8	15.84	2.3	0	
29-Dec	128	8	15.84	297	8	15.84	284	8	
30-Dec	123	8	15.84	57	8	15.84	199	8	
31-Dec	113	8	15.84	229	8	15.84	31	8	
1-Jan	59	8	15.84	55	8	15.84	605	8	
2-Jan	288	8	15.84	34	0	0	146	8	
3-Jan	150	8	15.84	24	8	15.84	52	8	
4-Jan	65	8	15.84	21	5	9.9	26	8	
5-Jan	44	4	7.92	19	3	5.94	16	0	
6-Jan	35	0	0	17	1	1.98	13	0	
7-Jan	27	8	15.84	15	0	0	11	0	
8-Jan	22	6	11.88	13	0	0	8	3	
9-Jan	20	4	7.92	14	0	0	6	1	
10-Jan	17	1	1.98	36	0	0	7.2	2	
11-Jan	15	0	0	23	7	13.86	6.1	1	
12-Jan	13	0	0	18	2	3.96	4.6	0	
13-Jan	12	0	0	16	0	0	4.2	0	
14-Jan	11	6	11.88	14	0	0	4.2	0	

	WY 2002			WY 2003			WY 2004		
DATE	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yiel**
15-Jan	11	6	11.88	12	0	0	4.4	0	
16-Jan	9.7	4	7.92	11	6	11.88	3.1	0	
17-Jan	8.6	3	5.94	11	6	11.88	2.3	0	
18-Jan	8	3	5.94	10	5	9.9	2.3	0	
19-Jan	7.7	2	3.96	11	6	11.88	2.3	0	
20-Jan	7.5	2	3.96	11	6	11.88	3.5	0	
21-Jan	7.2	2	3.96	12	0	0	3.4	0	
22-Jan	7.9	2	3.96	12	0	0	3.2	0	
23-Jan	6.8	1	1.98	11	6	11.88	1.9	0	
24-Jan	6.6	1	1.98	11	6	11.88	6	1	
25-Jan	6.9	1	1.98	10	5	9.9	4.9	0	
26-Jan	12	0	0	10	5	9.9	2.7	0	
27-Jan	16	0	0	9.3	4	7.92	2.6	0	
28-Jan	15	0	0	9.2	4	7.92	4.7	0	
29-Jan	13	0	0	8.3	3	5.94	3.9	0	
30-Jan	11	6	11.88	8	3	5.94	3.5	0	
31-Jan	9.3	4	7.92	8	3	5.94	3.6	0	
1-Feb	8.7	3	5.94	7.9	2	3.96	3.4	0	
2-Feb	8.2	3	5.94	7.4	2	3.96	92	8	
3-Feb	7.8	2	3.96	6	1	1.98	90	8	
4-Feb	7.5	2	3.96	6.8	1	1.98	49	8	
5-Feb	7.2	2	3.96	6.6	1	1.98	30	8	
6-Feb	7	2	3.96	6.6	1	1.98	21	5	
7-Feb	19	3	5.94	6.6	1	1.98	16	0	
8-Feb	69	8	15.84	6.4	1	1.98	12	0	
9-Feb	26	8	15.84	6.3	1	1.98	9.2	4	
10-Feb	16	0	0	5.9	0	0	7.9	2	
11-Feb	13	0	0	6.1	1	1.98	6.1	1	
12-Feb	11	6	11.88	8.9	3	5.94	6.4	1	
13-Feb	11	6	11.88	9.6	4	7.92	6.5	1	
14-Feb	10	5	9.9	8.1	3	5.94	5.8	0	
15-Feb	9.5	4	7.92	8.7	3	5.94	5.7	0	
16-Feb	17	1	1.98	86	8	15.84	18	2	
17-Feb	72	8	15.84	22	6	11.88	126	8	
18-Feb	30	8	15.84	15	0	0	552	8	
19-Feb	28	8	15.84	13	0	0	90	8	
20-Feb	56	8	15.84	11	6	11.88	54	8	
21-Feb	34	0	0	9.6	4	7.92	40	0	
22-Feb	28	8	15.84	8.8	3	5.94	39	0	
23-Feb	22	6	11.88	8.2	3	5.94	28	8	
24-Feb	20	4	7.92	13	0	0	29	9	
25-Feb	17	1	1.98	40	8	15.84	608	8	
26-Feb	15	0	0	17	1	1.98	401	8	
27-Feb	15	0	0	16	0	0	169	8	
28-Feb	14	0	0	12	0	0	97	8	
29-Feb	--	0	0	--	0	0	70	8	

DATE	WY 2002 USGS Q	Yield (cfs)	Yield (af)	WY 2003 USGS Q	Yield (cfs)	Yield (af)	WY 2004 USGS Q	Yield (cfs)	Yiel
1-Mar	13	0	0	11	6	11.88	61	8	
2-Mar	12	0	0	9.6	4	7.92	51	8	
3-Mar	11	6	11.88	10	5	9.9	39	0	
4-Mar	11	6	11.88	11	6	11.88	34	0	
5-Mar	10	5	9.9	9.8	4	7.92	28	8	
6-Mar	14	0	0	8.2	3	5.94	25	8	
7-Mar	36	0	0	7.4	2	3.96	23	7	
8-Mar	24	8	15.84	7	2	3.96	22	6	
9-Mar	15	0	0	6.9	1	1.98	18	2	
10-Mar	45	4	7.92	6.8	1	1.98	16	0	
11-Mar	26	8	15.84	7.4	2	3.96	16	0	
12-Mar	18	2	3.96	7.5	2	3.96	16	0	
13-Mar	15	0	0	8	3	5.94	15	0	
14-Mar	13	0	0	9.2	4	7.92	12	0	
15-Mar	13	0	0	58	8	15.84	10	5	
16-Mar	12	0	0	23	7	13.86	10	5	
17-Mar	38	8	15.84	16	0	0	9.7	4	
18-Mar	25	8	15.84	12	0	0	9.6	4	
19-Mar	16	0	0	9	4	7.92	9.6	4	
20-Mar	13	0	0	8.4	3	5.94	9.4	4	
21-Mar	12	0	0	7.6	2	3.96	8.9	3	
22-Mar	12	0	0	6.9	1	1.98	8.8	3	
23-Mar	109	8	15.84	7	2	3.96	7.6	2	
24-Mar	46	4	7.92	7.2	2	3.96	5.9	0	
25-Mar	30	8	15.84	5.7	0	0	16	0	
26-Mar	23	7	13.86	5.3	0	0	19	3	
27-Mar	18	2	3.96	5.1	0	0	7.5	2	
28-Mar	16	0	0	5.5	0	0	6.1	1	
29-Mar	14	0	0	4.5	0	0	5.4	0	
30-Mar	13	0	0	--	0	0	5	0	
31-Mar	11	6	11.88	--	0	0	3.5	0	
1-Apr	11	6	11.88	4.1	0	0	3	0	
2-Apr	11	6	11.88	5.4	0	0	2.9	0	
3-Apr	9.6	4	7.92	7.3	2	3.96	2.9	0	
4-Apr	9	4	7.92	18	2	3.96	2.9	0	
5-Apr	8.9	3	5.94	9.3	4	7.92	2.9	0	
6-Apr	8.7	3	5.94	5.9	0	0	3	0	
7-Apr	8.1	3	5.94	5.9	0	0	3	0	
8-Apr	7.7	2	3.96	6	1	1.98	2.9	0	
9-Apr	7.3	2	3.96	5.4	0	0	3	0	
10-Apr	7	2	3.96	5	0	0	3	0	
11-Apr	6.9	1	1.98	4.9	0	0	3	0	
12-Apr	6.8	1	1.98	72	8	15.84	3	0	
13-Apr	6.6	1	1.98	249	8	15.84	2.9	0	
14-Apr	6.4	1	1.98	56	8	15.84	2.9	0	

	WY 2002			WY 2003			WY 2004		
DATE	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yield (af)**	**USGS Q**	**Yield (cfs)**	**Yiel**
15-Apr	6.5	1	1.98	32	8	15.84	2.9	0	
16-Apr	6	1	1.98	24	8	15.84	2.8	0	
17-Apr	9	4	7.92	22	6	11.88	3.3	0	
18-Apr	7.2	2	3.96	19	3	5.94	2.9	0	
19-Apr	5.1	0	0	16	0	0	3	0	
20-Apr	4.8	0	0	14	0	0	3.6	0	
21-Apr	5.6	0	0	14	0	0	4.3	0	
22-Apr	5.7	0	0	13	0	0	2.8	0	
23-Apr	5.2	0	0	13	0	0	2.6	0	
24-Apr	5	0	0	22	6	11.88	2.6	0	
25-Apr	3.9	0	0	24	8	15.84	2.5	0	
26-Apr	3.9	0	0	25	8	15.84	2.4	0	
27-Apr	4.1	0	0	20	4	7.92	2.5	0	
28-Apr	4	0	0	56	8	15.84	2.2	0	
29-Apr	5.3	0	0	43	4	7.92	2.3	0	
30-Apr	4.8	0	0	29	8	15.84	2.2	0	
		2002Total:	**942 af**		**2003Total:**	**919 af**		**2004Total:**	

APPENDIX G
SUMMARY OF CENTRAL CALIFORNIA COAST STEELHEAD COLLECTIONS AND OBSERVATIONS IN THE SAN FRANCISQUITO CREEK WATERSHED

Summary of Central California Coast Steelhead Collections and Observations in the San Francisquito Creek Watershed
Prepared by NOAA National Marine Fisheries Service
January 2012

I. Collections

1. Results reported by Darren Fong for fish surveys in Upper West Union Creek in 1996 and 1999.

In 1996, Fong conducted snorkeling surveys in West Union Creek. Surveys were confined to pools because creek levels were too shallow to snorkel other habitat types. Steelhead were observed from multiple age classes, including young-of-the-year (less than 102 mm in fork length), 1+ (ranged between 110 and 146 mm fork length), and 2+ fish (ranged between 158 and 178 mm in fork length). Density of steelhead juveniles ranged from 0.29 fish per meter to 5.42 fish per meter.

In 1999, Fong conducted snorkel surveys and electrofishing surveys on West Union creek. Steelhead young-of-the-year, 1+, and 2+ steelhead were observed. Fong estimated 501 young-of-the-year and 92 older steelhead in pools along Upper West Union Creek. Fong assumed riffle and flatwater habitat had few, if any, steelhead, and did not include these habitats in the analysis.

2. Results reported by A.E. Launer, D. Spain, and G.W. Holtgrieve for Stanford field collections in Los Trancos Creek and San Francisquito Creek between 1997-2000.

Researchers surveyed reaches of San Francisquito Creek and Los Trancos Creek in from 1997 to 2000 using backpack electrofishers and dip nets (Launer and Spain 1998; Launer and Holtgrieve 2000). The stream reaches surveyed primarily consisted of isolated pools where block nets were not required. Minnow traps and hoop net traps were used in non-native hotspots and in deep pools. Fish observed were reported as number of fish encountered per minute. Launer (2010) provided a supplemental report on the data collected by Launer and Spain (1998) and Launer and Holtgrieve (2000) between 1997 and 2000. This supplemental report reanalyzed encounter rates of juvenile steelhead to provide the number of fish per mile of stream sampled. The abundances of fish reported in the Launer 2011, ranged between 0 and 673 fish per mile in San Francisquito Creek, and 92 and 994 fish per mile in Los Trancos Creek.

3. Fish relocation results reported by D.W. Alley and Associates for the Sand Hill Road Bridge and Stanford Golf Cart Crossing construction projects in San Francisquito Creek in 2004.

Fish were captured and relocated as part of construction activities for the Sand Hill Road Bridge and the Stanford Golf Cart Crossing projects in 2004 (D.W. Alley and Associates 2004). Biologists caught and relocated 40 juvenile *O. mykiss* in 230 feet of stream during construction dewatering (June 4-14, 2004) at the Sand Hill Road bridge site and 41 *O. mykiss* within 350 feet of stream (August 30-September 2) at the Golf Cart Bridge Crossing.

4. Fish relocation results reported by Todd Ellwood, CH2MHILL, for the Bear Gulch Creek Station 3 Fish Screen Installation Project in 2007.

Fish were captured and relocated as part of the construction activities for the installation of a fish screen at California Water Services Company Station 3 diversion on Bear Creek. Between October 2 and October 5, biologists relocated 3 steelhead from the dewatered work site (about 25 linear feet). One fish was approximately 2 inches in length and two fish were approximately 5 inches in length.

5. Fish relocation results reported by T. Zigterman for the Stanford Steelhead Habitat Enhancement Plan (SHEP) Project on Los Trancos Creek and San Francisquito Creek in 2009.

Fish were captured and relocated as part of construction activities for upgrades to the fish screen and fish ladder at Stanford's Los Trancos Creek water diversion, and upgrades to the fish screen at the San Francisquito Creek Pumping Plant in 2009 (Zigterman 2011). Biologists caught and relocated 17 *O. mykiss* (50-200 mm) in 120 feet of stream during construction dewatering at the Los Trancos Creek site (June20-30 and September 29). Biologists caught and relocated 21 *O. mykiss* (less than 200 mm) within 270 feet of stream (July 15-23) at the San Francisquito Creek site.

6. Fish relocation results reported by Patrick Kobernus, Coast Range Ecology, for a bank stabilization project at 125 Fox Hollow Road on Bear Gulch Creek in 2009.

Fish were captured and relocated from the work site (about 1550 linear feet) by electrofishing prior to dewatering and dip nets during dewatering. Between October 10 and October 14, 8 steelhead were captured and relocated from the work site. They ranged in lengths from 83 mm to 110 mm (total length).

7. Fish relocation results reported by A. Launer, for the Portola Valley C-1 Trail bank stabilization project in Los Trancos Creek in 2011.

Fish were captured and relocated as part of construction activities for stabilization of a stream bank and realignment of the C-1 Trail on Los Trancos Creek south of the Westridge Road and Alpine Road intersection (personal communications with A. Launer, Stanford University Conservation Program Manager September 2011). Biologists caught and relocated 39 *O. mykiss* (50 to 300 mm) in 220 feet of stream during construction dewatering at the Los Trancos Creek site (August 24-26, 2011).

8. Fish relocation results reported by L. Wise, for the PG&E gas pipeline repair project in San Francisquito Creek in 2011.

Fish were captured and relocated as part of construction activities for repair of a PG&E natural gas pipeline across San Francisquito Creek near the Junipero Serra Blvd Bridge (Wise 2011). Biologists caught and relocated 5 juvenile *O. mykiss* (78-150 mm) in 85 feet of stream during construction dewatering on September 15, 2011. High stream flows on October 5 caused the cofferdam system to fail and the block nets to fall, allowing the work site to re-water. Biologists caught and relocated 7 juvenile *O. mykiss* (71-191 mm) in 95 feet of stream during construction dewatering on October 7, 2011.

II. Observations and Secondary Accounts of Steelhead Collections

1. <u>Excerpts from a review of steelhead distributions in the San Francisquito Creek Watershed between 1905 to 2004 conducted by R. Leidy, G. Becker, and B.Harvey.</u>

Leidy et al. (2005) assessed the past and present distribution of *O. mykiss* in streams tributary to the San Francisco Bay using historical and recent records. They reviewed maps depicting historical conditions produced by the San Francisco Estuary Institute, as well as data collected during 1993-1998 surveys by Robert Leidy, and more recent surveys and observations by various Federal, state, and local biologists. Leidy et al. (2005) includes reports of steelhead in San Francisquito Creek from as early as 1905 (Snyder 1905). Other reports cited include accounts of steelhead in portions of San Francisquito, Los Trancos, and Bear creeks on Stanford's lands from 1953 to 2002. Most of the information provided by Leidy et al. (2005) is qualitative, and, while useful in confirming the presence of steelhead in these reaches, provides little information on the abundance or density of steelhead. However, in some instances, Leidy et al. (2005) did provide quantitative information, that was useful in determining the abundance of steelhead in the action area. This information is provided below. A complete record of all of the observations and collections, and references cited by Leidy et al. 2005 is available at the following website address: http://www.cemar.org/pdf/sanmateoandsanfrancisco.pdf.

> *San Francisquito Creek*
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> *In July 1976, DFG visually surveyed San Francisquito Creek from the confluence with Bear Creek to the mouth. Staff cited severe drought conditions as resulting in low O. mykiss abundance (only ten YOY* [young of the year] *steelhead were observed) (Cogger et al. 1976d).*
>
> *Later that month, DFG electrofished four sites on San Francisquito Creek [and observed] eight steelhead ranging from 43 to 147 mm were found in the vicinity of Junipero Serra Boulevard (Cogger et al. 1976a).*
>
> *San Francisquito Creek was sampled at five locations in August 1981 as part of a fish distribution study. Two O. mykiss (51, 73 mm) were collected near Alpine Road (Leidy 1984). Four downstream locations (three consisting of intermittent pools) did not appear to contain O. mykiss.*
>
> *Leidy electrofished San Francisquito Creek upstream from the Los Trancos Creek confluence in January 1994* [and did not observe] *O. mykiss. However, in September 1994, he caught a 212 mm FL O. mykiss while sampling a 30-meter reach below Sand Hill Road (Leidy 2002).*

In 1998, SCVWD staff rescued O. mykiss from the lower reach during dewatering of the channel (J. Abel pers.comm.).

In May 2002, photographs were taken of two adult steelhead (~630 mm) in lower San Francisquito Creek. (Stoecker 2002).

Los Trancos Creek

The Department of Fish and Game electrofished three Los Trancos Creek sites in July 1976. At the lowermost Los Trancos Road crossing[.] [A] 300-meter reach produced 46 O. mykiss (38-236 mm FL), and YOY were numerous (Cogger et al. 1976b).

According to a 1979 DFG letter, sampling was performed on Los Trancos Creek under the I-280 bridge in June 1978. At that time, 412 YOY[young of the year] O. mykiss were found in the plunge pools of the fish passage weirs (Paulsen 1979).

Three sites on Los Trancos Creek were sampled in 1981 as part of a fish distribution study. Three-year classes of O. mykiss appeared to be represented in a 20 meter isolated pool immediately downstream of Arastradero Road. Fish collected included five O. mykiss measuring 71-92 mm FL and two larger individuals (190, 335 mm). Surveys at two downstream locations (at Westridge Drive and upstream from Interstate 280) and one upstream location (at the second Los Trancos Road crossing) revealed no O. mykiss (Leidy 1984).

In January and September 1994, Leidy electrofished a reach of Los Trancos Creek just upstream from the San Francisquito Creek confluence. He caught four O. mykiss (68, 68, 89, 90 mm FL) in January and estimated density at 10 per 30 meters (Leidy 2002). In September, he caught five O. mykiss (65–90 mm) and estimated density at 20 per 30 meters. In June 1998, Leidy electrofished Los Trancos Creek approximately 325 feet upstream from Pleasant Hill Road. No O. mykiss were found (Leidy 2002).

Bear Creek

In June 1976, DFG visually surveyed Bear Creek between its mouth and headwaters at the confluence of West Union and Bear Gulch Creeks. The Department of Fish and Game found about 150 O. mykiss fingerlings, despite severe drought conditions in that year (Cogger et al. 1976c). In July 1976, DFG followed up the stream survey on Bear Creek with an electrofishing survey. A total of 36 O. mykiss (41-211 mm) were sampled from sites upstream of Sand Hill Road and upstream of Mountain Home Road (Cogger et al. 1976a).

In June 1978, DFG electrofished Bear Creek at Sand Hill Road and at Mountain Home Road, two O. mykiss (81 and 97 mm FL) were caught and measured, while

50-75 YOY and three larger individuals (~125 mm) were observed but could not be captured due to faulty equipment (Torres and Paulsen 1978).

In August 1979, DFG electrofished Bear Creek at Mountain Home Road, three O. mykiss (170, 188, and 216 mm FL) and 82 YOY (51-104 mm) were collected. The Department of Fish and Game noted an apparent lack of age 1+ fish and attributed it to a lack of recruitment in 1978 (Anderson 1979).

In 1984, an isolated pool 0.2 miles downstream from Adobe Corner was sampled as part of a fish distribution study. Five O. mykiss (59-111 mm) were found in a ten-meter reach (Leidy 1984).

An adult steelhead was observed in Bear Creek in 1995 (685 mm) and in 1998 (760 mm), respectively (M. Stoecker pers. comm.).

2. <u>A summary of steelhead observations made by Matt Stoecker in the San Francisquito Creek Watershed between 1999 and 2001.</u>

Matt Stocker (2002) conducted visual surveys in many stream reaches of the San Francisquito Creek watershed between 1999 and 2001. Stoecker (2002) reported observations qualitatively for most streams, and estimated the size of adult steelhead when they were observed. These observations provide presence/absence data for steelhead in many streams where steelhead monitoring has never occurred. The results of these observations show that steelhead occur throughout the Corte Madera, West Union, Bear, and Los Trancos creeks sub-watersheds. Stoecker also observed *O. mykiss* upstream of Searsville Reservoir in the Corte Madera Creek sub-watershed.

3. <u>Results of juvenile steelhead/rainbow trout (*Oncorhynchus mykiss*) surveys in Los Trancos Creek in 2002 conducted by D. Vogel.</u>

Snorkeling and walking surveys were conducted in Los Trancos Creek during the late winter and spring of 2002 (Vogel 2002). Surveys were performed three times during the late winter and spring. The stream reach surveyed began at the confluence of San Francisquito Creek and Los Trancos Creek and ended 1.6 miles upstream from Stanford's Los Trancos Diversion Facility. The entire survey length was 3.9 miles. Researchers estimated juvenile steelhead densities of 247 (March), 375 (April), and 945 (May) fish per survey reach. Newly emerged fry contributed to a large number of steelhead (945) observed in the May survey. Researchers observed 11 redds and 8 "possible" redds in the reach surveyed.

4. <u>Results of spawning habitat surveys conducted by the Santa Clara Valley Water District in San Francisquito and Los Trancos creeks between March - April 2003.</u>

Los Trancos Creek was walked by Santa Clara Valley Water District (SCVWD) personnel between March 14, 2003, and March 27, 2003 (SCVWD 2004). The surveys began at the confluence of San Francisquito Creek and Los Trancos Creek and ended about 5 miles upstream of the confluence. Researchers observed three redds. Surveyors did not quantitatively assess the abundance of juvenile steelhead in Los Trancos Creek, but observed steelhead in “varying numbers” throughout the survey reaches, with the highest observed juvenile densities in mid reaches.

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